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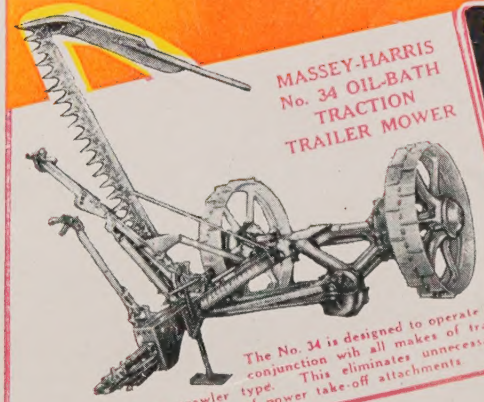

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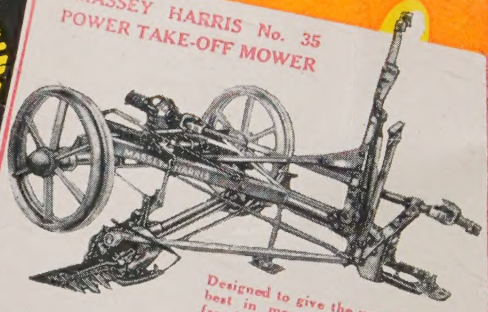

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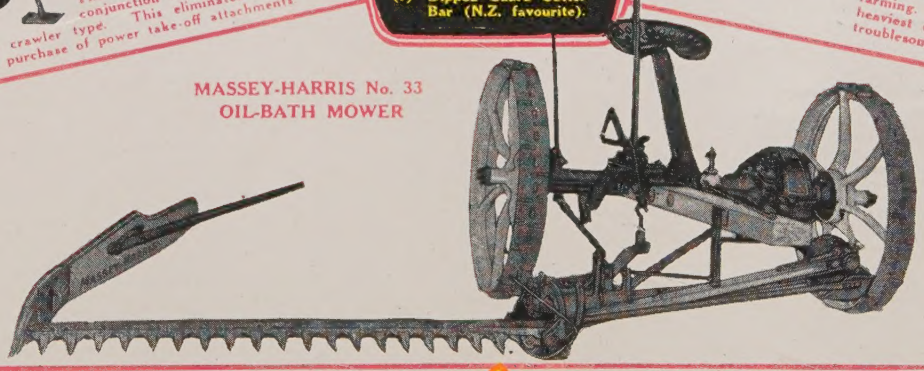

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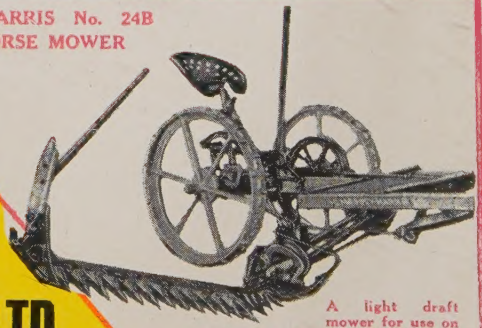

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SURPLUS WATER . . . .

Good Drains Make A Better Farm

—By—
N. LAMONT,
Instructor in Agriculture,
Masterton.

NO other farm operation is of such fundamental importance as the provision, where necessary, of sufficient drains to remove quickly all surplus soil water. Money spent on pedigree stock, pedigree seeds and fertilisers is wasted where soil drainage is neglected.

It is significant that, as soon as settled farming evolved in history from primitive nomadic methods, attention was at once directed to this all-important operation. In the ancient Greek and Roman Empires, the use of stone, fascine and tile drains was understood. In England and Europe, development in drainage practices was slow until about the seventeenth century, but since then the subject has occupied a prominent place in agricultural literature.

The earliest types of drains used were fascines, or a variety of tiles, and although mole drainage was in use about 100 years ago, it did not become popular until very recently, when the introduction of traction engines, and then tractors, provided farmers with a source of power to do this work efficiently. In New Zealand in the early days, an abundance of practically costless timber made box drains popular, but their use steadily declined as timber supplies became more scarce and tile manufacturing developed.

Basic Principles

The simple object of drainage is to remove excess water from the topsoil within a few hours of rain. Soil, in structure, is somewhat similar to a sponge with large and small pore spaces. The smaller pore spaces retain moisture by the force of capillarity—much as blotting paper absorbs water—but the larger spaces in the soil allow water to pass through under the influence of gravity. This proportion of the total water in a soil—the "gravitational" water—is of no use to a plant, and its presence is, in fact, detrimental. Consequently this is the water that we seek to remove by drainage. No amount of drainage or "over-drainage" will remove the "capillary" water from which the plant roots draw their supplies, and this is lost only by evaporation from the surface of the soil.

Light-textured, sandy soils, providing that an outfall exists, permit gravitational water to escape rapidly, but close-textured, clay soils have insufficient natural channels by which water may escape. Consequently these must be provided artificially in the form of drains.

The essential principle of all draining is to tap the source of the excess soil water. Sometimes a spring emerges on the upper levels of a slope, and by cutting this off, it is possible to save a large area from being saturated. More often the "source" of excess soil water is not localised in a spring, but is to to be found over the entire area, and is in actual fact located in the sub-soil. Rain water passing downwards through the large pore spaces of the soil performs highly important functions, and it is not desired, even if it were practicable, to tap this water during its downward course.

It is only when this water reaches an impervious layer, and then fills the soil pores to saturation, that drains commence to operate. It must be remembered, too, that the only force that causes water to move in the soil is the force of gravity which operates, of course, vertically. Horizontal movement of soil water takes place only when it becomes necessary, in order to adjust water levels in the soil. The cutting of a drain at any point lowers the soil water level at that point. As a consequence water moves sideways from the surrounding soil.

The extent and speed of this horizontal movement depend upon the difference created in the water level—that is, upon the depth of the drain—and upon the resistance of the soil to the passage of the water, which is, of course, much greater in clay soils than in sandy ones.

Benefits of Drainage

As we have seen above, the plant roots obtain their moisture supply from the smaller pore spaces in the soil, so if the larger spaces are also filled with water no useful purpose is served. In fact, the consequences may be serious to the welfare of soil and plant.

Plant roots will not penetrate into soil that is saturated, and, naturally, restricted root development means restricted leaf production. Also a high spring-water table, by confining root development to the upper soil layers

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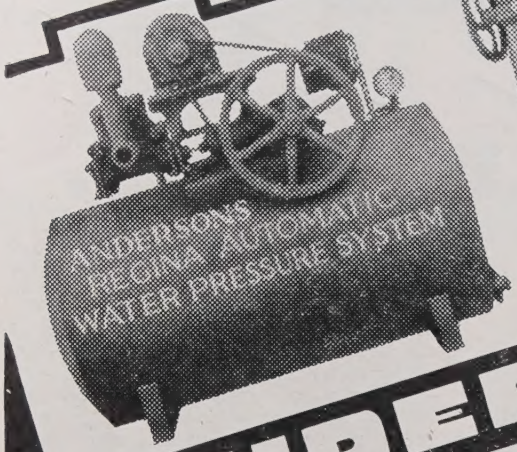

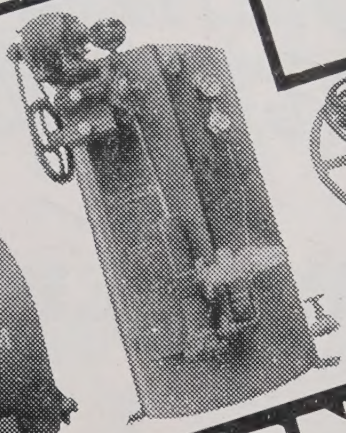

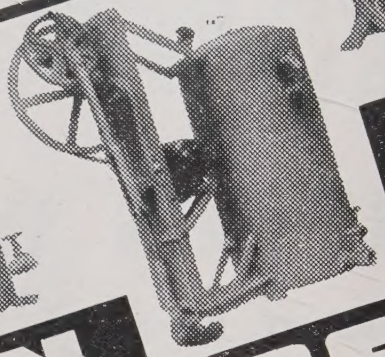

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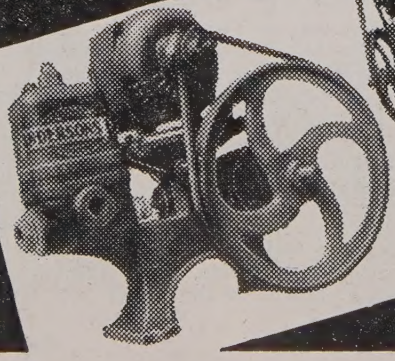
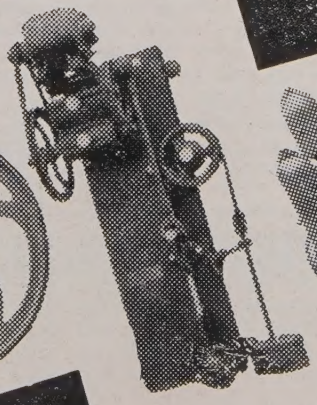
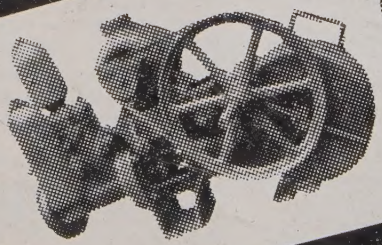
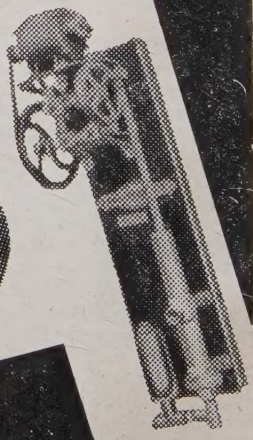








Subsidiary drains should enter main drains at an acute angle using properly made junction tiles.

will render the plant more susceptible to drought later in the season.

A healthy soil needs air as well as moisture. A drowned soil rapidly deteriorates as a result of the production of substances that are actually poisonous to plants, while, in extreme cases, a peat is developed. On the other hand, the texture of a heavy soil rapidly improves after draining, when not only can cultivation work be commenced earlier in the season, but, having developed a desirable "crumby" structure, the soil will work down to a good tilth much more readily than a soil that has been pugged all winter.

All are familiar, too, with the cooling effect of evaporating moisture. A wet soil is cold, even though air temperatures may be warm, and consequently badly drained soils are always backward in the spring until the surplus water has been removed by evaporation. The sun raises the temperature of a well-drained soil quickly in the spring, and the passage of warm, spring rains through free-draining ground warms the soil and draws behind it warm, fresh air to stimulate plant growth.

A healthy, well-drained soil means healthy stock, indirectly through increased pasture production, and directly, in its effect on the health of animals who do not have to live and sleep on waterlogged soil.

Pedigree stock, pedigree seeds, rotational grazing, and top-dressing all depend for complete exploitation upon thorough soil drainage.

Depths and Distances

The ideal depth of drains is one which will maintain the soil water level—the "water table"—permanently low enough to permit plant roots to develop to their fullest extent, and also to operate at a depth beyond ordinary summer drying-out. In deep, silty soils, roots of ordinary crop and pasture plants may penetrate three or four feet, but where a stiff clay subsoil is found about 12 inches or so below the surface, it is unlikely that roots will penetrate far into this, even if it is well drained.

In deciding the depth at which to place drains, the following points have to be considsidered:—

(a) **Outlets:** First and foremost, one can only drain to a depth permitted by the depth of the water courses or streams into which the drainage outlets are to be led.

(b) Protection: The drains must be deep enough to be safe from damage by stock or implements.

(c) Power: In the case of mole drains, the power available must be considered.

(d) In deep, silty soils, drains will be 3 ft. or 4 ft. deep, but where there is a well-defined clay subsoil, 2 ft. 3 in. to 3 ft. for tiles, or 18 in. to 2 ft. in the case of mole drains.

The distance between parallel drains is dependent upon depth and soil type. In free-draining soils, drains may be effective if the distance apart is 15 to 20 times the depth—that is nearly a chain apart for drains three or more feet deep—but in heavy soils the distance apart may be only four or six times the depth, say 6 ft. to 8 ft. apart for drains (moles) 18 in. deep.

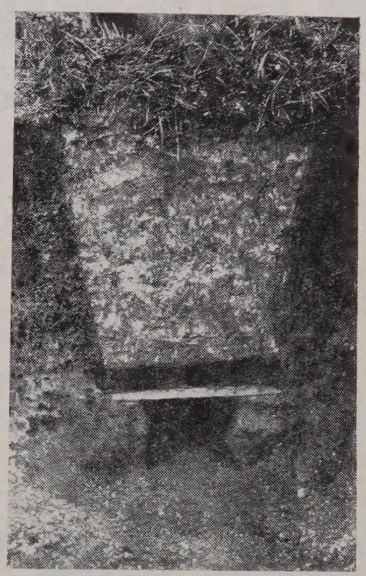
In practice, drains are probably more often made too shallow than too deep, though it is true that soil texture improves and becomes more porous as a consequence of draining, and drains that seem a little too deep, and a little too far apart, in the first season or two, may prove completely satisfactory after a few years.

Various Types

A great variety of materials has been used successfully for providing a channel for drainage water. In most cases, however, the labour cost in opening and closing drains is one of the biggest items, and it is sound economy to employ permanent materials underground. On the other hand, high transport costs of tiles, or the fact that only a temporary drain is required, justify the use of less satisfactory materials.

(a) Surface and Open Drains: Occasionally one sees an area ploughed in narrow lanes, with or without an extra furrow turned in the hollows, and this practice is described as surface drainage. While it has the advantage perhaps of preventing pools of water from accumulating, it can hardly be dignified by the name of drainage, as it confers few, if any, of the benefits to soil and stock that result from proper draining, since the soil will still be saturated to the surface.

Open drains have a place, at least, for mains alongside fences. Where there is no solid foundation for tiles, as



A slab drain made by cutting a narrow channel in the bottom of a drain and placing a wooden slab across the shoulders.

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in peat swamps, open drains must be used. As a general rule, however, their use is limited, and to permit the passage of cultivators and topdressing implements, some form of closed channel is necessary.

(b) Fascine or Brush: This method has been employed for centuries, and when properly used is very successful. Fairly strong scrub is preferred, and it should be laid so that the butts of one bundle are covered by the brush of the next. Some difference of opinion exists as to whether the butts should point up or down the slope of the drain. It is argued by some that the ends of the sticks obstruct the flow if pointing up the slope, but, on the other hand, the side branches ought to be equally obstructive if the ends point down the slope. This does not seem to be a vital point, and good results may be obtained either way.

It is generally advisable to tile or box three or four yards at the outlet of a fascine drain, as where the material is exposed to the air, it tends to rot quickly.

(c) Tiles: The most popular of covered drains is undoubtedly the tile drain, and this will prove the most efficient on most soil types. The relatively high cost of tile drains must rule them out on sticky clay soils where they would have to be very close together, and it is arguable whether even a long term view would justify their use. In some clay soils, after, say, fifteen to twenty years, tiles appear to become sealed by gradual deposits of clay in the joints, and one would suggest that mole drains would be the more efficient under such conditions.

A cross section of a fascine drain.

(d) Mole Draining: Where we have a stiff, clay, subsoil, free from iron-pan or other obstructions, a fairly even ground surface and a natural fall, mole draining can be employed satisfactorily. It is by far the cheapest method of draining, and under suitable conditions is probably the most efficient.

The life of mole drains depends on the suitability of the soil type and upon the efficiency with which the work is carried out. Under good conditions, individual mole drains can last more than twenty years, but a mole-draining system would probably need to be renewed every five to ten years to ensure effectiveness. Bearing in mind, however, that its cost may be only about one twentieth of the cost of a tile system on heavy clay ground, the use of this method is fully justified.

The suitability of a subsoil for mole drainage can be judged reasonably well by moulding a piece in the hand, when the plasticity or otherwise will indicate whether a mole drain will be likely to stand.

Planning a Scheme

The first step to be taken after deciding to drain an area is to locate suitable points for outlets. The following points should be borne in mind:—

(1) Outlets are generaly but not always at the lowest points in a paddock. If these low points are likely to be flooded even temporarily, it is better to

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leave a small area undrained than risk the success of the whole project.

(2) Outlets should be placed with reference to possible future expansion of the drainage scheme.

(3) They should be placed where there is minimum risk of blockage by stock or other causes.

(4) By reducing the number of outlets to a minimum, it is possible to take more care in their protection and regular inspection during wet weather.

When the position of outlets is decided, the whole scheme should be planned completely before the work is commenced. Building on the foundation of carefully selected outlets, the mains, submains if necessary, and the subsidiary drains, can be planned efficiently and economically.

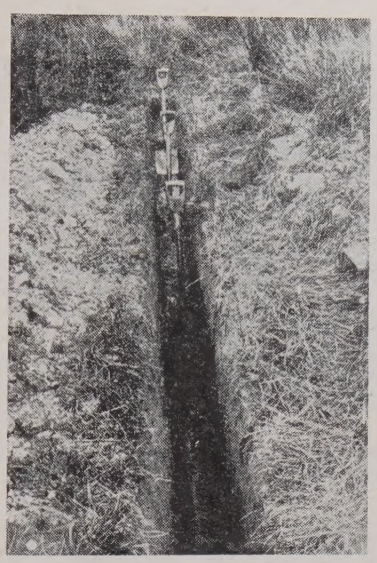
It is highly important also to prepare a reasonably accurate plan of all drains, particularly tiles, laid on a property. It is quite impossible to rely on memory. The man who prepares an accurate plan will be amply repaid in time and money saved when repairs or extensions become necessary.

Finally, should there be the slightest doubt as to the amount of fall available, some form of level should be employed. If a surveyor's instrument can be obtained so much the better, but if not, a satisfactory substitute must be devised. On no account should guessing be relied upon.

Construction Methods

A drainage system may consist of any one or any combination of the different types of drains mentioned above. Probably the most popular are the "all tile" systems and the mole-drain systems with varying numbers of tiles for mains and outlets.

Another type of slab drain popular in the early days of abundant timber supplies.



An ordinary spade leaves the bottom of the drain too wide and displacements will follow. The last spit should be removed with a draining spade and the bottom cleaned with a draining scoop.

Tile-Drain Systems

Except for clay soils suited to mole draining, there is no more efficient method of draining than by the modern, cylindrical "tile" or pipe. Providing the job is well done, the drains are more or less everlasting, and they confer immeasurable and cumulative benefits on soil, plants and livestock.

It is recorded that, many years ago in America, the neighbours of a certain farmer became very alarmed because they noticed that this man dug clay from one part of his farm, and after moulding and baking it, carefully buried it again. Despite suggestions that he be put under restraint, this pioneer of tile-draining required only a very few years to establish both his sanity and the benefits to be derived from efficient tile-draining.

General Lay-out

It is impossible to give detailed suggestions that will fit every case. Each paddock requires separate consideration. Having selected the position of the main outlets, it will be found, as a general rule, that the mains and "submains" will be placed along natural depressions and hollows in the paddock or along the lowest side on flat sloping country. The mains and sub-mains are only carriers of water, the ground on each side of them being already drained by the subsidiary drains. Consequently, it is sound economy to reduce their number to a minimum.

All drains, and mains, particularly, should be as straight as possible. Sudden angles must be avoided. Right-angle junctions between subsidiary drains and the mains are also undesirable, and the former should be placed so that two do not enter the main exactly opposite each other.

Even in fairly heavy soils, tile drains should have at least 2 feet clearance above them—that is, the drains should be 27 in. to 30 in. deep and in freer soils they may be as deep as 4 feet. The width apart depends partly on soil type and partly upon depth. In heavy silt soils, with drains three to four feet deep, they may be a chain to a chain and a half apart, but on heavy soils drains every half-chain may be necessary.

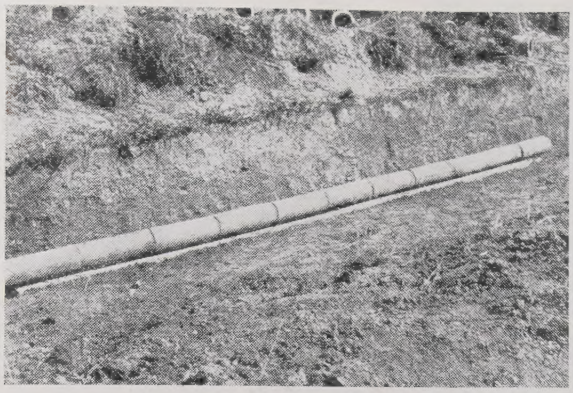
As the permeability of soils improves after three or five years' draining, the drains will gradually become effective over a wider area. If possible, it is wise for each farmer to carry out some experiments to determine the depth and distance apart that is efficient under his own conditions. One or two drains can be laid in a paddock, and their performance observed over two years or so before an expensive, large-scale project is embarked upon—always remembering that a further improvement in effectiveness can be expected.

Capacity of Drains

The capacity of a drain depends on the fall and diameter of the pipe.

Very little fall will suffice in a well-laid pipe-drain. Probably as little as

A cross section of a well-finished pipe drain. The bottom of the drain was little wider than the tile, and movement is consequently impossible.



Where the tiles have to be laid over a soft area a board may be placed underneath to prevent subsidence.

one in a thousand would be efficient. One in three hundred is a fair gradient to aim at. In most cases the contour of the country will decide the matter. It is very important to avoid a loss of fall in the length of a drain, as this will inevitably lead to silting up, but a slight increase in fall is, of course, quite permissible.

In practice, it is found that tiles less than 2½ in. to 3 in. in diameter are undesirable on account of the risk of displacement and blockage. Pipes of this size are large enough for all purposes except mains. As a rough guide, it is generally estimated that a pipe of 3 in. diameter will carry all the water from 10 to 15 acres, a 4 in. pipe will suffce for 15 to 20 acres, and so on. Although very approximate, this rule can be applied to drains of known length and distance apart, and to mains receiving the discharge from subsidiary drains tapping a known area.

Opening and Laying

Draining is generally carried out during the winter, partly because at this season a farmer is most likely to have time to attend to such work, and partly because it is easier to get a clean-bottomed trench under damp conditions. Furthermore, a small amount of water in a drain is a useful guide in obtaining a level bottom.

It is advisable to open no more drain than can be conveniently finished in a short time, or alternatively, to partly dig the whole system and leave the cleaning of the bottom until the tiles can be laid without delay, otnerwise weathering or scouring can cause a good deal of trouble.

It will be found that an even depth can be maintained more easily by commencing to dig from the lowest end of the drain, and a substantial amount of labour can be saved by turning the first spit with a single furrow plough.

A tile-drain trench should be no wider than strictly necessary, and the sides should be trimmed smooth to reduce the risk of small lumps falling in while the tiles are being laid. For a thorough job a draining spade and scoop are essential. The last spit should be dug with the draining spade, giving a bottom that is only just wider than the tile itself. When this is cleaned and shaped with the scoop the tile will bed down neatly with no risk of displacement.

Should a portion of the drain be accidentally dug too deeply, every effort should be made to grade out the depression without losing fall, as it is essential that the tiles rest on a solid foundation. If the bed is loose, displacements must occur.

Even the best of tiles may not be precisely square on the ends, and they should, if necessary, be turned, so as to make a close joint at the top to prevent soil from getting in. It is not desirable to jam the tiles hard against each other, but even on moderate slopes, laying should commence at the lower end to ensure that a tile does not move away from its neighbour.

Filling In

All drainers are agreed that the topsoil should be thrown on one side of the drain, and the subsoil on the other, but there is a difference of opinion as to whether the topsoil or the clay should be returned first. The professed object of returning the porous topsoil first is to permit the water to enter the tiles more readily. On the other hand, water enters the tiles from below, and the placing of loose topsoil on the tiles merely increases the risk of silting.

Consequently, it is recommended that the subsoil be returned to the drain first, and it will be found that the drain will not only function as well, but will probably remain efficient for a longer time. Even when mole drains are being drawn over the tiles, it will be found that the disturbed clay will permit water to pass from the moles into the tiles, and when it has settled down channels will still remain.

Tile draining is fairly expensive, but has a very long life. As a consequence, meticulous care and thoroughness should be applied, to ensure that efficiency of operation and long life are secured.

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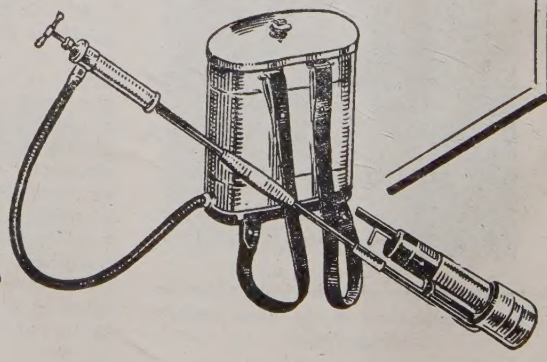
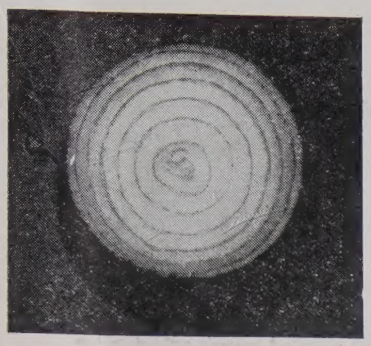




A sound, well-formed onion which was cut for examination on September 15.

Storage of Onions

——By——

A. A. POWELL,
Cool Storage Officer,
Wellington.

An onion which had developed early sprouting on September 15.

FROM experience gained in co-operation with onion-growers in Canterbury during the last two seasons and a careful study of the onions held for storage, a number of factors have been found to be responsible for losses during storage. These include the development of rots from disease infection, which has caused exceptionally heavy losses during harvesting and storage.

When a portion of the onion crop has been affected with downy mildew, the presence of the fungus in the bulbs from that portion of the crop can be surmised. Some of the affected bulbs develop rots early in their storage, but otherwise survive, and must be cut in order that the infection may be discovered. When infected bulbs are planted for seed, the fungus ascends the growing leaves, and under moist conditions a crop of spores is produced on them. From these spores surrounding healthy plants become infected. In addition, large numbers of resting spores are sometimes produced within the dead tissues, and on the decay of the leaves they reach the soil. They remain alive and may constitute a second source from which a crop may become infected.

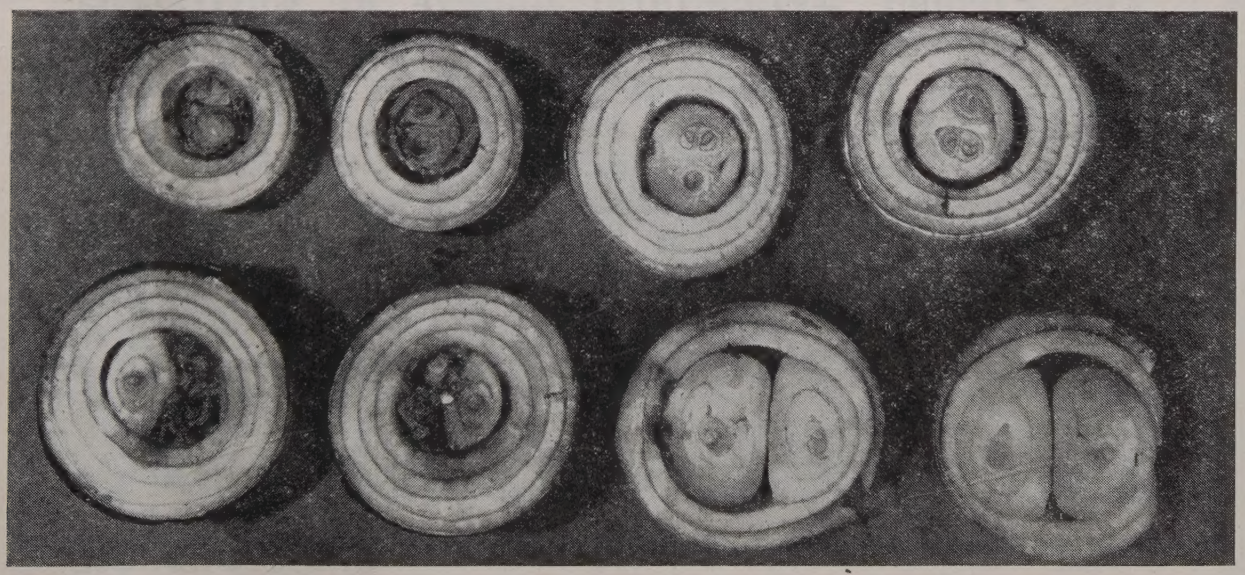
Dampness a Danger

Damp conditions are favourable to the development of mildew. Cultivation should be good, and weeds kept down to avoid a damp, stagnant atmosphere around the plants. The spores of downy mildew cannot withstand high temperatures or dry conditions. The heating of the bulbs, before storage, to 108 deg. F. for 10 hours kills the fungus without seriously injuring the bulbs. This possible method of control may be tested at Marshlands during the coming season.

Field and Shed Sanitation should be carefully carried out by raking up from the field, and destroying, by burning, all loose skins, stems and bulbs which have been rejected during harvesting, as well as those rejected when sorted in the shed before marketing.

Sprouting

The sprouting of onions during storage frequently results in heavy losses. This factor varies in degree from time to time, irrespective of the method of storage adopted, and it would therefore appear that careful selection of the bulbs from which seed is to be saved will help considerably in bringing about an improvement. Reference to the illustrations will show the difference in internal structure between bulbs which have commenced to sprout and bulbs which still remain sound.



Faulty scale formation in onions which were cut for examination on September 15. Internal rotting from disease-infection is shown in some of these samples.

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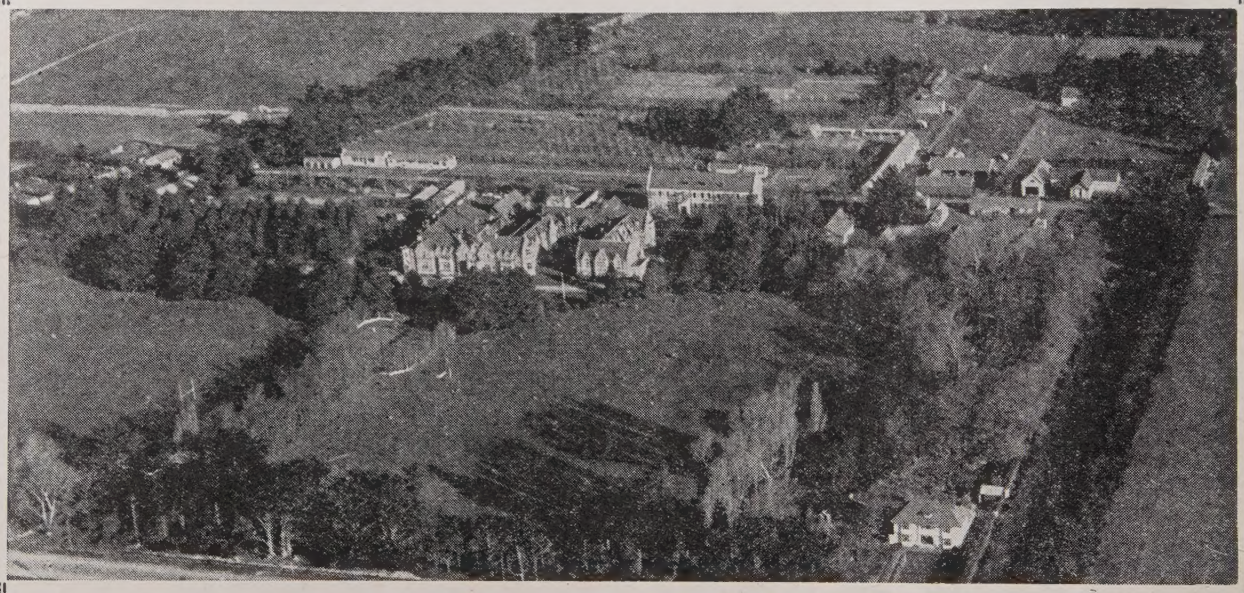

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WEEDS

Perennial Weeds

— By —
S. H. SAXBY,
Instructor in Agriculture,
Dunedin.

Sheep's Sorrel (*Rumex acetosella*).—This well known plant is one of the commonest weeds in New Zealand. It perpetuates itself by means of seed, and creeping underground runners which send up shoots at intervals to form what are, in effect, new plants.

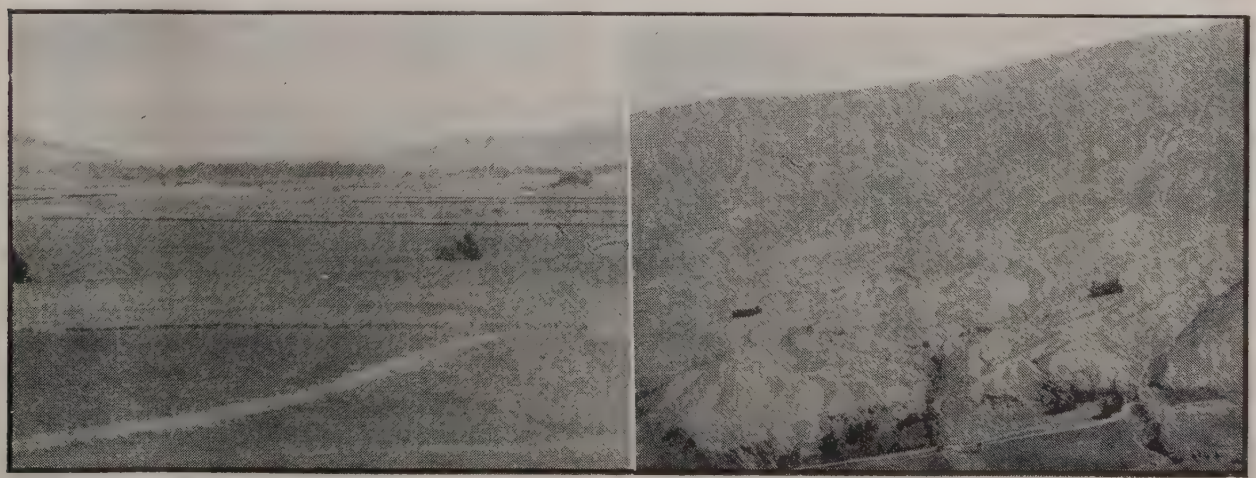
The presence of sheep's sorrel is very widely regarded as an indication that the soil is sour. Whilst sheep's sorrel certainly does thrive in sour soils, it should not be forgotten that it will also grow very well indeed on soils that are far from sour. For example, in certain parts of Central Otago, and where the soil is anything but sour, sheep's sorrel dominates very large areas. Its presence, however, can be regarded as an indication that conditions are not suitable for the satisfactory growth of better species of pasture plants. On certain of the sour country in South Otago sheep's sorrel thrives, whereas, plants such as ryegrass, and white clover can barely exist. With the application of lime and phosphate the grasses and clovers grow particularly well and the sheep's sorrel fades into insignificance.

This change is due not to the fact that the lime or the phosphate has banished the sheep's sorrel, but to the fact that the grasses and clovers have smothered it out. Sheep's sorrel will not stand strong competition whether this comes from strong growing plants or from heavy grazing. It is for these reasons that sorrel is seldom seen in good pastures carrying a heavy concentration of stock.

On much of the lower tussock country in the South Island sheep's sorrel is a very common constituent of the sward, and while its production is relatively low, there is no doubt that it does contribute something to the carrying capacity of the country. On the very dry country of Central Otago already referred to, and where it is the dominant plant, there is no question that it is quite valuable.

Periodically there are outbreaks of sorrel poisoning in stock. As a rule this takes place in the spring when it affects ewes in milk. The trouble is usually worst when ewes are shifted from paddocks free from this weed on to ones where it is in abundance. The immediate remedy is the removal of the sheep from these pastures. The ultimate remedy is where possible the creation of conditions that will enable the formation of a better sward.

Sweet Briar (*Rosa rubiginosa*).—Is a tall growing rose-like plant, and is troublesome chiefly on very poor country such as river beds or dredge tailings where practically no other plants will grow. On good pasture land it is of no account but is sometimes prominent on some poor hill country pastures. Cutting prevents seeding but has practically no harmful effect on the plant. It does not carry



Left.—At one time this was known as the "Red Plain" on account of the prevalence of sheep's sorrel. As the result of heavy liming and the application of phosphates this country now grows excellent crops and pastures. *Right.*—On certain country such as the barren depleted area shown above, sorrel is of some value at least as it does provide feed in an area where few other useful plants will grow.

Left.—Sweet briar has become established in many dry areas. In some parts eradication is not difficult. On dredge tailings as depicted above the value of the land is so low that the expense of the eradication of the briar is very high. *Right.*—Tutsan which is shown above is very often confused with St. John's wort. Tutsan is a woody shrubby plant with relatively large leaves.

fire and the only satisfactory manner of eradicating it is by digging or by pulling it out with a team and chain. Burning off the top growth with a flame thrower and treating the subsequent growth with sodium chlorate has been found to be successful.

From the control aspect it has the great disadvantage of being entirely neglected by stock, in distinction to gorse which is eaten to some extent at least, especially when small. On account of its unattractive nature stock will not penetrate it in order to get at the more palatable grasses. Sweet briar is spread very largely by the agency of birds through which the seeds will pass unharmed.

The presence of sweet briar affords an excellent example of a garden plant "gone wild." It was introduced as a favourite ornamental plant in gardens over one hundred years ago. and very soon established itself out of bounds as a weed.

Tutsan (*Hypericum androsaemum*). —Tutsan is a very common introduced plant that flourishes in moderately high rainfall areas. It has become a very common plant of bush fringes and gullies. Tutsan is very frequently referred to as St. John's wort, particularly by people that have never seen the latter.

Tutsan is a shrubby, perennial deciduous plant growing to a height of 3 feet or so. The stems, leaves and berries are frequently used for ornamental purposes on account of their rich "autumn" colours. These berries are very attractive to birds which are largely responsible for its widespread distribution.

As a weed of farm lands it must be grouped with a number of native plants that come in following bush burns or gain entry on bush fringes. Sometimes it may form pure associations of a considerable acreage but as a rule is associated with other plants of a similar habit. Control measures adopted depend very largely on the value of the land. On country that can be ploughed and converted to good pastures initial eradication is relatively inexpensive.

On poor or hill country the eradication of tutsan is often too costly to warrant extensive measures being adopted. Tutsan does not carry a fire

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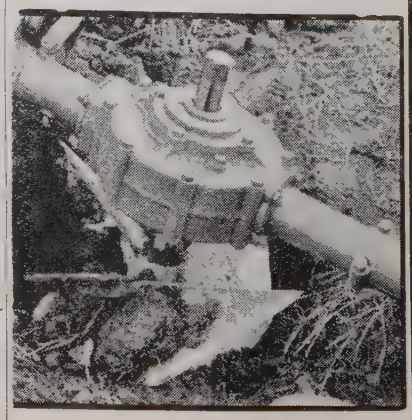

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Left.—On account of its poisonous properties tutu is a menace to travelling stock which may eat sufficient when hungry to result in serious poisoning. *Right.*—Yarrow is a "twitchy" plant and is therefore a bad weed on arable land.

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at all well, consequently the burning of standing areas is unsatisfactory. Grubbing and burning is the only effective method of eradication on hill country.

Tutu (*Coriaria spp*).—There are several species of this native plant, but, except for their size, they are of similar agricultural significance. Tutu varies from a small relatively prostrate plant to a handsome, small tree, growing to a height of 20 ft. or more. Although it is very common on forest margins, tutu, particularly the smaller types, is often found in association with small manuka and on disturbed tussock country.

As a weed plant tutu is of most significance on account of its poisonous properties. Although all parts of the plant may be poisonous, the greatest concentration of poison is usually in the young shoots and the seeds.

The incidence of poisoning by tutu is extremely variable. Animals, apparently quite used to tutu country, may suddenly eat it in sufficient quantities to cause severe poisoning. On the other hand, stock may run on tutu country for long periods with no harmful effects.

In general, but by no means always, the animals that succumb most readily are those that are hungry when they go on to tutu country for the first time. Tutu infested roadsides are also a common source of trouble as hungry stock will frequently pick at any plant whilst passing.

Regarding control measures, hand grubbing is effective, but slow, as the complete plant has to be removed. Removing everything above ground level merely allows the plants to revive from

the crown. It has been reported that goats can be used with a considerable measure of success. In using goats care should be taken to ensure that these are introduced to tutu areas gradually, and that they are able to feed on it at will rather than by being forced to eat it. Under these conditions the goats do not suffer and the tutu is greatly reduced.

Yarrow (*Achillea millefolium*).—Yarrow is a perennial and very "twitchy" plant. The leaves, which are dark green and finely divided, often form a dense mat on the surface of the ground. The flowering stalks are about 2 to 3 feet in height and bear clusters of small white, pink or red flowers.

Yarrow is present in many parts of New Zealand, but is most common in the arable districts of Canterbury, Otago and Southland. As is the case with other plants of a twitchy nature, yarrow increases rapidly in soils that are naturally loose, or that are frequently under cultivation.

On poor, dry country yarrow produces an appreciable amount of feed which sheep eat very readily. On this type of country it is one of the last plants to wither off in drought periods. A yarrow infested paddock, when ploughed, will provide useful feed as sheep are not only very fond of the runners but also "do" well on them.

Nevertheless yarrow must be regarded as a bad weed on arable country on account of the competition it sets up with the sown crop, and the labour that is involved in eradicating it.

In an old pasture the yarrow roots will be mainly near the surface. Consequently deep ploughing followed by light surface working will assist in its control. Summer fallowing followed by an autumn sown smother crop will further reduce it.

Yarrow is occasionally deliberately sown in this and other countries for feed purposes. As a result of this there is a limited market for the sale of yarrow seed.

Sheep and Lambs

THE number of sheep and lambs shorn during the 1942-43 season was 34,505,290, as compared with 33,814,663 in 1941-42, while lambs tailed numbered 18,864,892, as against 18,523,290.

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quoted from a remarkable tribute to efficacy of cobaltised Super and/or cobaltised lime, applied to pasture when topdressing, in freeing hundreds of thousands of acres in Rotorua district from deficiencies causing bush sickness. See March, 1943, issue Journal of Agriculture.

The Mamaku experimental farm is situated on land where previously "it was impossible to rear either sheep or cattle successfully. Last winter "432 mated ewes were grazed there on 102 acres of pasture, the only "supplementary feed being a little hay cut from the grazing "area, and a few swedes grown on a small paddock outside "this area. From these ewes 468 lambs were marked . . . "By the middle of February **454 had been sold fat "to the works,** leaving only three lambs unfit for "killing. **These results were obtained by topdressing "with cobalt, which is the procedure recommended "by the Department of Agriculture for all cobalt "deficient areas where topdressing is the normal "practice** . . . If farmers are unable to obtain cobaltised "super, quite satisfactory results can be obtained in **the prevention of bush "sickness by the use of cobaltised lime.** Cobaltised lime is not on the "market, but it **can be easily prepared by the farmer himself.** Six pounds "of cobalt sulphate could be mixed with 1 cwt. of lime, and then this "concentrate should be diluted by mixing with 19 times its volume of lime. "The cobaltised lime mixed according to the above formula should be "applied at the rate of 1 cwt. per acre."

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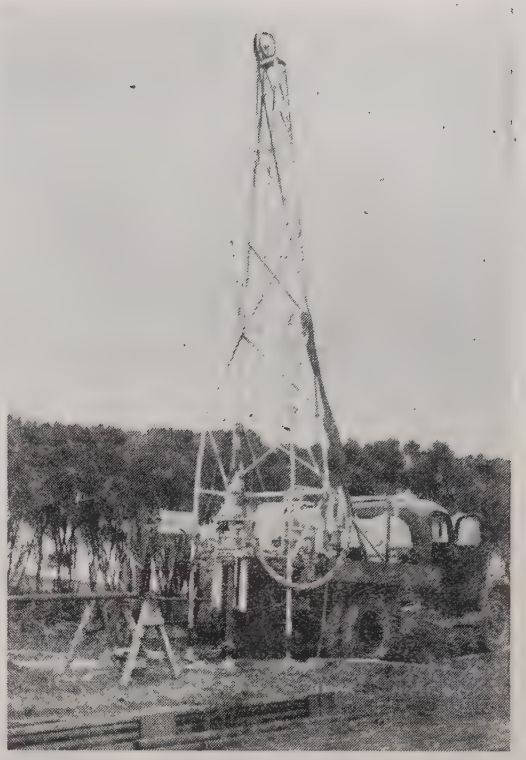
Combating Drought on Limestone Country

— By —

P. S. SYME, Instructor in Agriculture, Warkworth.

Although many limestone soils are capable of carrying first-class dairying pastures, the provision of an adequate supply of water for livestock often presents peculiar difficulties, and herd yields frequently suffer badly in a dry season. This article outlines the experiences of a farmer on a limestone soil, and describes how he eventually solved his water-supply problem.



A modern well-boring plant. This machine is capable of boring to depths of over 1000 feet. The experience of many farmers goes to show that boring for water on limestone country is apt to be both speculative and costly.

OWING to the impermeable nature of limestone, water does not sink into the rock, and on this account boring is liable to prove a very costly and speculative operation—a fact which many farmers know to their sorrow. In the first place, the depth of the limestone formation is an unknown quantity. It may extend to a thousand feet or more, and even if this be pierced, there is still no guarantee of water.

Everything depends on the underlying stratum, which again is only too often another unknown quantity. Should the bore penetrate into a conglomerate or a greensand formation, a plentiful supply of water may be assured. On the other hand, should the underlying stratum prove to be impervious to water, as often happens, the net result is likely to be an expensive, but entirely useless, hole in the ground.

Matter of Luck

Sometimes, where the limestone is of a very hard type, seamed with cracks and fissures through which water can descend to accumulate on the impervious underlying stratum, the gamble of boring may turn out to be a very lucky investment. This, however, is often unpredictable, and success depends largely on the element of good luck.

Under these discouraging conditions, it is not altogether surprising that well-borers may refuse to work on the "No water, no payment" basis common in more favoured districts, where an ample supply may confidently be predicted almost regardless of the site of the bore, over areas extending to hundreds of square miles. Such districts are indeed the water-diviner's paradise. He just cannot go wrong.

Difficulties Overcome

In spite of the inherent difficulties, however, many farmers have demonstrated that a useful supply of water can still be provided on limestone country even under the most un-

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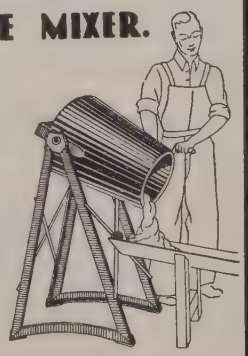

A typical supply dam on limestone country. Loss from evaporation can be greatly reduced by planting suitable shade trees, and the area should be fenced off to prevent fouling by livestock. Drinking-water contaminated in this way is one of the commonest causes of disease and mortality in young stock.

promising conditions, and in this connection the experience of a Northland farmer, Mr. S. J. Walker, of Silverdale, may be of interest.

Mr. Walker's property is situated on a very extensive limestone formation, and no natural supply of water is available anywhere on the farm in even a moderately dry season. Under these conditions the dairy herd suffered severely, and in spite of abundant feed, the yields were disappointingly low. Realising that any further improvement in his herd yields would be quite impossible until he solved his water problem, Mr. Walker took stock of his position.

Potential Sources

He began by considering the potential sources of water available to him. The possibility of boring on the limestone he at once dismissed, as being too speculative and costly. There is, however, a sandstone formation on a hill near the boundary of the farm, and on this he decided to try boring. At a depth of 55 ft., his enterprise was rewarded by a small, but gratifying supply. Having found water, Mr. Walker's next problem was to get it to the shed.

Tanks being scarce and expensive, he decided to dig a reservoir out of the solid limestone, into which the water could fall by gravity from the top of the bore. Piping was in short supply, but by one means and another he secured a number of lengths of old rejected piping, and although the screw threads had practically rusted off, he contrived to make watertight unions with discarded teat cup rubbers. This carried the water to the reservoir, well on the way to the shed. Later, as opportunity offered, he was able to complete the connection, but while the supply was greatly appreciated, it was insufficient for the needs of the farm, and it required pumping.

Having satisfied himself that the small limestone reservoir was completely water-tight, Mr. Walker did some more hard thinking. His problem, he argued, was not so difficult as it seemed. After all, he got his share of rain, and, through the winter, actually had a superabundance of water. The problem was not so much one of finding water as of conserving it.

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Reasoning that 1 inch of rainfall on 1 acre is equivalent to about 100 tons, he reckoned that with a rainfall of over 50 inches per annum, one acre should receive about 1,120,000 gallons. Assuming his requirements to be about 1000 gallons per day in summer, this would provide sufficient water for 1120 days! Even after allowing for losses due to evaporation and in collection, this seemed to provide a pretty safe margin for a few dry months.

Considered in this way, the problem became simply one of collection and storage. Having succeeded so well with the small limestone reservoir, he decided to construct a larger one, situated on sloping ground, so that the rainfall could readily be diverted into it by a series of converging plough furrows drawn on the upper face of the slope. Such an enterprise could not be economically carried out on a horse scoop or a wheelbarrow scale, but, fortunately, a bulldozer was at work on an adjoining quarry, and the driver readily undertook the work of excavation.

Constructional Work

Work was commenced by removing the surface soil and loose limestone to a depth of about 2½ ft. with the bulldozer. When the hard underlying limestone was reached, progress became very slow until the problem was solved with a few pounds of gelignite. The limestone was shattered by the explosions to a depth of about 9ft., so that the bulldozer could again operate effectively. Although the charge for the bulldozer was £2/10/- per hour, which might have seemed a prohibitive price, the time taken to complete the job was only about 1½ hours.

The total cost for the bulldozer and the gelignite combined amounted to slightly less than £5.

The reservoir consists of a trench about 15 ft. wide and 16 yards long, with the ends sloping down to a depth of about 9 ft. towards the middle. Allowing for the loose topsoil, the excavation in the actual limestone has a holding capacity of about 24,000 gallons. It will be agreed that this provides a remarkably cheap reservoir at the out-of-pocket cost of only about £5.

Actually, however, Mr. Walker claims that the reservoir practically paid for its cost in providing free lime. Much of the limestone spoil, removed by the bulldozer after the blasting, had been crushed into small fragments, and an appreciable portion was almost as fine as if it had gone through a crusher.

Accordingly, Mr. Walker spread this over the farm and has been rewarded by a very fine sward of grasses and clovers.

A surface reservoir on Mr. Walker's farm excavated into the solid limestone. This reservoir has a capacity of about 24,000 gallons, and has proved completely leak-proof.

Watertight As Concrete

After having had experience with both dams and excavated reservoirs, Mr. Walker considers that the limestone reservoir is much the better proposition. In the first place, it is cheap and is unaffected by storms. It is as watertight as concrete; it does not silt up, and the sides are not very liable to slip. In addition to these virtues, it readily collects water, as the seepage from further up the slope works down between the subsoil and the limestone, and eventually percolates into the reservoir. Even one acre, as already mentioned, can provide a very considerable quantity of water, and on this account the catchment area need not be very large.

If practicable, it is an advantage to have the reservoir well up on a slope, in order to provide sufficient pressure

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Carrots	88.2
Peas	81.4
Beans	88.0
Parsnip	78.6
Pumpkin	90.5

for a gravity supply. Apart also from selecting the site with an eye to its convenience as a reticulation centre, care should be taken to make sure that sufficient water will be available to supply the reservoir in preparation for a prolonged drought. The rate of accumulation can be greatly expedited by a fan-like pattern of furrows radiating downwards to the reservoir.

Mishap With A Dam

In further efforts to exploit water conservation to the limit, Mr. Walker had an unlooked-for mishap, when he decided to construct a concrete dam across a small gully on another portion of the farm. The site was selected with great care at a point where the gully narrowed between high banks and below another tributory gully. Conditions appeared ideal. The dam was well buttressed and of very solid concrete, while the large catchment area gave promise of an ample volume of water. Alas! The volume of water proved only too ample, and following a small cloudburst, the greater part of the concrete work disappeared down the gully within a week of its erection.

Undeterred, and with the aid of a scoop and the bulldozer, Mr. Walker constructed another dam, an earthen one, on the same site. This dam was reinforced by tree trunks, and to some extent also by the remnants of the concrete structure. Appreciating the importance of making the dam completely watertight, special care was taken to keep the soil well packed as each successive course was laid, this being assisted by copious applications of water to help puddle the clay.

Vibration Does the Trick

On completion of the work, to make assurance doubly sure, Mr. Walker proposed to keep the bulldozer moving backwards and forwards for some time on the top of the earthworks, but the driver knew of a better way. He simply drove on to the dam, stopped his machine, and kept the engine turning over briskly. The resulting vibration proved much more effective than mere weight alone, and lowered the earthworks by about a foot in a few minutes. When the whole of the surface had been consolidated in this way, Mr. Walker was satisfied that he had a really watertight job, and time has shown that his confidence was not misplaced.

With two good surface reservoirs supplying water, in addition to his bore, Mr. Walker now faces the driest summer with complete confidence. The past autumn, as every farmer in the district knows, was probably a record season for drought. Despite this, Mr. Walker succeeded in raising his output of butterfat by 2000 lb. from a herd of 50 cows. His farm, he contends, does not differ materially from other limestone farms, and the rain descends upon the just and the unjust alike. There is, he declares, no water-shortage problem; the only problem is one of water conservation, and to this he is satisfied he has now found an effective answer.

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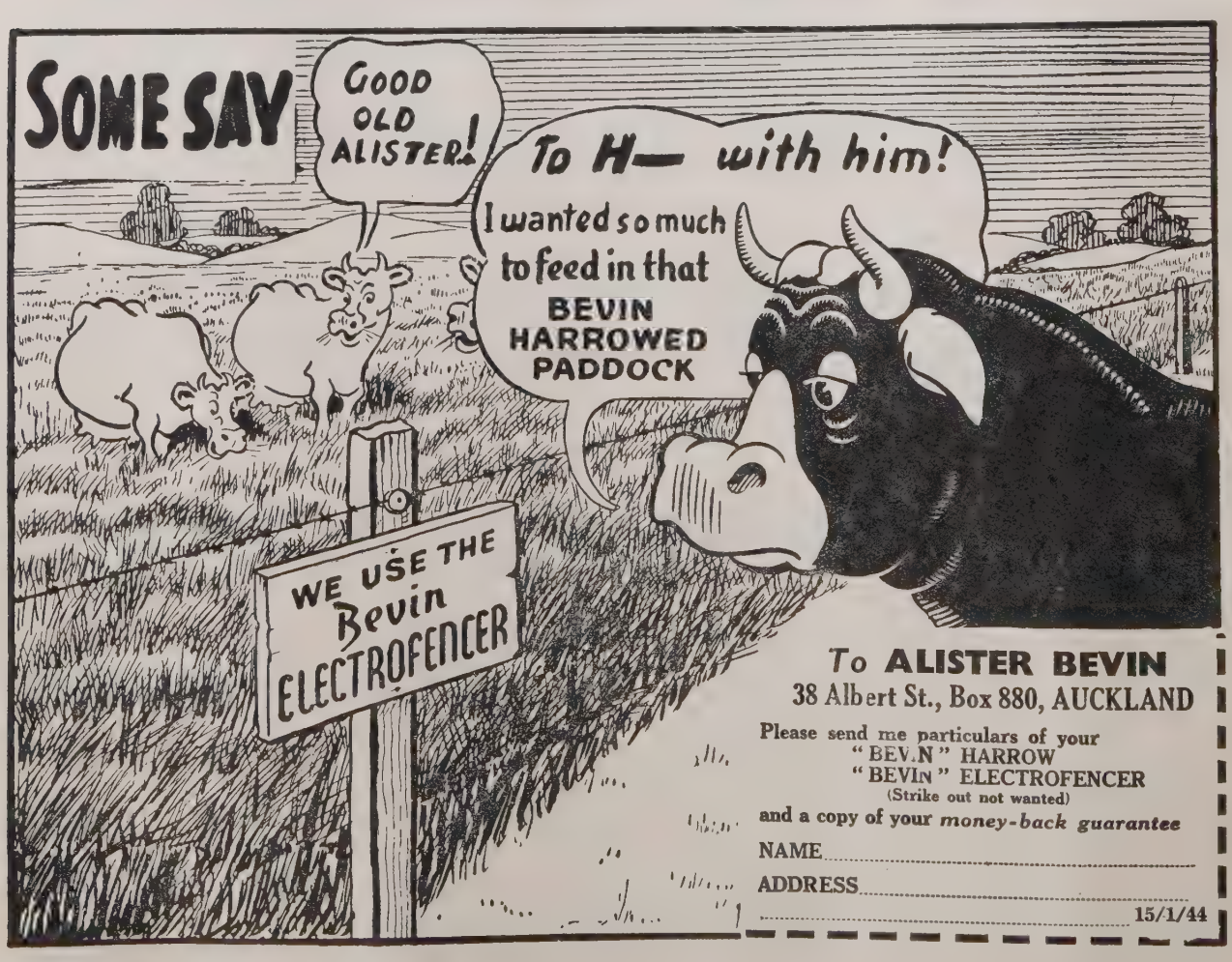
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Good Pigs and Increased Pig-Meats

— By —
H. M. PEIRSON,
Acting Superintendent of the Pig Industry, Wellington

NEW ZEALAND'S war effort, as it applies to pig production, has suffered a serious set-back. Unfortunately, there have been a number of factors which have mitigated against producers' increasing or even maintaining pig production.

At the commencement of the war, the United Kingdom Government agreed to purchase all New Zealand's exportable surplus of meat products, but until the occupation of Denmark by Germany there was no exceptional demand for pig-meats. When Denmark was occupied, the United Kingdom requested an increased production from New Zealand. Producers responded by increasing their output (for the year ended September) to over 1,000,000 carcases in 1941 from that of the previous season, 1940, which was 870,000.

At this stage, however, owing to the necessity of conserving shipping, an effort was made by the United Kingdom to secure such increases as were necessary from Canada and America, on account of the much shorter haul. Consequently, the New Zealand Government was informed that the export of pig-meats from New Zealand was not required by the United Kingdom, and the industry was advised to this effect.

Again, the change-over from butter to cheese, and in the following year the change back again from cheese to butter—both actions taken in compliance with the British Government's request—gave a general feeling of instability and uncertainty within the pig industry. These unavoidable factors were to be regretted, but they were caused solely by the development of the war situation.

War in Pacific

With the spread of the war to the Pacific, a reversal of the policy was necessary, and the industry was advised that there was again an urgent and very substantial demand for pig-meats; but the damage had been done. Producers had withheld sows from the boar, with the result that production fell in 1942 to 920,000 carcases, and to the low level of 758,000 in the season ended September, 1943. It is essential that this drop in pig production be arrested if New Zealand is to meet her share of the requirements of the armed forces in the Pacific. It is essential also that this be done on a profitable basis.

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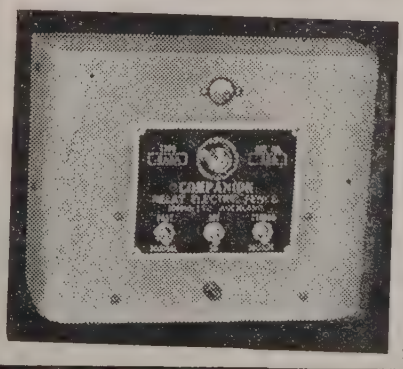

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It was once said, and is true today, "that the ice gets thin when an attempt is made to tell the other fellow his business," and since the production of good pigs is chiefly a matter of common sense, this article might seem rather unnecessary.

It is mostly a repetition of what every sound producer does, but there are always those who are making a start, and a perusal of the following points will at least provide them with something to discuss, refute, or try out, according to their viewpoint.

Before it is possible to get results from pigs, time and thought must be given to organising, or arranging for, an adequate and cheap feed supply. It must be cheap, because, when a ton of feed is turned into pig-meat only about £9 worth of meat is produced. It must be adequate, because having underfed pigs about the place opens the door to disease. Because feed is worth only £9 per ton, it does not mean that higher prices cannot be paid. It always pays to use small amounts of high quality, and therefore high-priced, feeds, in order to get the best value out of bulk supplies of home-produced feed, such as skim-milk, whey, roots, or grass.

Consideration could be given to the following points as a step in the direction of ensuring an adequate and cheap supply:—

1. One gallon of milk, or two gallons of whey, represents a pound of feed of grain quality—barley, maize, pollard, oats, wheat—not bran or brewers'

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grains, or malt calms. Ten pounds of roots or green crop, including grass, represents 1 lb. of standard feed.

2. Where the by-product is separated milk, one cow (500 gallons) represents 500 lb. of feed which should be used along with one cwt. of grain or meal, and two tons of grown crops or grass, i.e., 400 lb. of feed as such. Most of the roots and half the meal are used for winter feeding. Thus, each cow is equivalent to half a ton of pig-feed; 500 lb. of milk; 100 lb. of grain or meat-meal; 400 lb. roots—total, 1,000 lb.

Pig-Meal per Cow

Using these two basal facts, the ideal amount of pig-feed that should be made available on any farm can be calculated from the number of cows milked. Farmers may object that they do not use meal in that proportion. Information collected shows that they are wasting milk, unless they use at least one cwt. of pig-meal per cow, even when meal is £14 per ton. They may object to the amount of roots or grazing necessary. The proportion of roots to total feed, i.e., 40 per cent., has been shown to give the best return. Others may use 3 or 4 cwt. of meal per cow. Unless they use correspondingly increased amounts of grazing roots or other cheap feeds, the use of these larger amounts of meal, even with meal at £6 per ton, is not as efficient as it might be.

3. Every six pounds of feed can produce one pound of pig-meat as dressed carcase. The feed supply from a 24-cow herd at half a ton of feed per cow, as stated above, represents 12 tons of pig-feed, capable of producing 2 tons of pig-meat. This could be done with 2 sows producing bacon (28 pigs of about 140 lb. each), 3 sows producing pork (42 pigs of about 90 lb. each), or 8 sows each producing 2 litters of 320 lb. alive at eight weeks. It is more usually done by having 4 sows, each producing an average of 1,000 lb. of pig-meat as weaners, pork, and bacon, depending on the amount of milk available.

The **ideal** set out above means the selling of approximately £4-worth of pigs per cow, and the expenditure of approximately £1 per cow, 10/- on meals and 10/- on the growing of roots. **This money check is the quickest way of sizing up the pig situation on most farms.**

Details of Feeding

It is impossible to anticipate the kind of enquiry that is made about details of feeding practice. A brief outline of points that can be recommended generally is supplied as an initial step.

1. Grow ⅛ to ¼ acre roots for every sow kept.

2. Buy 1 cwt. meal (as pig-feed) for every cow milked.

3. Farrow sows in June and December; get first litter away as bacon in January; second litter as pork or light bacon in mid-May; winter as few pigs as possible, preferably sows with litters.

4. Feed always to all pigs after they have passed the weaning stage at least 2 lb. of high-quality feed, i.e., 2 gallons of skim-milk or 2 lb. of grain daily. If no milk is available, not less than half a pound of meat-meal (small pigs) and up to 1 lb. for bigger ones should be included in the 2 lb. of meal. This meal must be of a barley quality —peas, maize, oats, pollard, wheat—not bran, brewers' grains, or malt calms.

5. The above is a foundation only. When there is plenty of milk, feed as much as the pigs will eat. When milk is not available, feed as much as the pigs will eat of roots or grass, in addition to the foundation of up to 2 lb. of meal.

6. If meat-meal is not used, feed about 2 ounces of animal fat daily. House refuse, rendered fat, or dripping is a cheap insurance against ill-health.

7. For pigs in sties, some green food or vegetable daily is advisable.

8. One ounce daily of a mineral mixture, consisting of four parts lime (ordinary carbonate) and one part salt, is useful and inexpensive. Another mixture fed at the same rate is four parts lime, four parts steamed bone-flour, one part salt. Steamed bone-flour may be replaced by super.

9. Feed sows well for the first six weeks after service. Feeding at this time, more so than at any other time, ensures good litters.

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10. Use a creep to feed litters from the age of three weeks so as to ensure 40-lb. weaners, and feed weaned pigs well till they are at least 70-lb. weight, or 3½ months old. This ensures healthy pigs resistant to disease and infection, and reduces condemnations and rejections at slaughter.

11. Watch the health of pigs carefully. Digestive troubles are often removed by 24 hours' starvation, and are the beginning of more serious upsets.

12. When a new feed has to be used, make the change gradually. Sudden changes of feed often cause upsets.

Rationing Tables

The accompanying tables are intended to serve only as a **guide** to the quantities which should be fed under average conditions.

Growth Rate

It must always be remembered that a strong growing litter will require more food daily than a weaker lot. The kind of growth rate that may be expected where conditions of housing, grazing, and feeding are exceptional, is given in the table following:—

	Weight. (lb.)	Increase per Day. (lb.)	Food Required. (lb.)
Birth	2½	—	—
3 weeks	12	.50	—
5 ,, ...	22	.75	—
8 ,, ...	40	1.00	2½
10 ,, ...	55	1.10	3¼
12 ,, ...	70	1.10	3½
14 ,, ...	90	1.42	4
16 ,, ...	114	1.70	4½
18 ,, ...	138	1.70	5½
20 ,, ...	162	1.70	6½
22 ,, ...	176	1.70	6½
24 ,, ...	200	1.70	6½
26 ,, ...	220	1.42	6½

When all the points mentioned are followed, profits are real, and the drudgery of pig-keeping disappears.

Strangely enough, while a pride of ownership is exhibited in any other class of stock, the pig, in most cases, seems to be the exception to the rule. Perhaps this is because the scavenger idea has been allowed to cloud our appreciation of its reproduction qualities, or may be the fact that it has lived under adverse conditions so long and shown a profit has obscured our appreciation of the **real value of the pig** when given the right attention and care.

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SOWS AND BOARS.

	Food Allowance per Head per Day, in lb.
In-pig sows	4-6-8 lb., according to condition and stage of pregnancy.
Suckling sows	8lb. at farrowing, increased by 1 lb. per day each week thereafter (i.e., 10 lb. when litter is 2 weeks old). "Creep" feed litter from 3 weeks old.
Boars	4-6-8 lb., according to condition and amount of work.

Never feed more than the pigs will clean up in 15 to 20 minutes.

War Damage Insurance

A REDUCTION in the annual premium rate for war damage insurance from 5/- to 1/- per cent., to take effect as from March 1 next, is announced by the Minister of Finance, Hon. W. Nash.

The Minister added that on the reassembly of Parliament it was proposed to extend the War Damage Act to cover earthquake damage and to provide for all premiums at the 1/- per cent. rate to cover both earthquake and war damage.

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CARE OF MILKING MACHINES

TO TAKE great care in the production of good pastures and healthy cows is rather pointless if the milk cannot be efficiently taken from the animals as it is produced. The milking machine is the device which enables the farmer to collect the valuable foodstuff which has been produced by that remarkable organism, the dairy cow. Smooth, efficient milking is not possible with a machine which is faulty mechanically, and in these times, when it is hard to get a serviceman to come to the farm to fix things which have gone wrong, the farmer himself has to add another duty to the almost innumerable variety already requiring his attention. This article offers to practical farmers hints on the kind of attention which will ensure smooth running from the milking machine.

By
W. G. WHITTLESTON,
Animal Research Station,
Wallaceville

IN discussing detailed attention to the machine, stress should be placed on the principle that regular attention to the parts needing it is worth much more in every way than an occasional burst of general tinkering and adjusting. It is much more sensible to lubricate moving parts regularly than to spend valuable hours and bank-notes in replacing worn parts, quite apart from the inconvenience which can be caused when a neglected part goes wrong in the middle of milking. The following points are intended as suggestions which it is realised may be impracticable on many farms where labour shortage is acute. However, the points made should be regarded not as ideals but as practical normal steps to be taken in order to keep the machine in good running order. The main individual components of the machine will be taken in turn and their upkeep and adjustment briefly discussed.

Electric Motor

Provided that the motor is placed so that it cannot get wet and, where necessary, it is lubricated correctly, it will run for years without any trouble. When a motor has provision for lubrication the manufacturer's advice should be followed, as too much lubrication can cause almost as much harm as lack of it in some electric motors. The following points indicate trouble which should receive immediate attention by an expert:—

1. Excessive heating. The average motor should run at about blood heat. A much higher temperature indicates an overload or a fault.

2. The blowing of thermal cut-outs or fuses. If a cut-out or a fuse blows do not merely replace it and hope for the best. It is an indication of a fault which should be rectified before irreparable harm is done.

3. Heating localised round the bearings is due usually to lack of lubrication. This is easily fixed but do not overdo it!

Driving Gear

Belt Drives.—The following rules should be followed for all belt drives and particularly for V-belts:—

1. Never force a belt on to the pulleys with a tool. In the case of V-belts the motor should be moved towards the pump a little and the belt fitted by hand by turning the pulleys. Where the drive is from a V-pulley to a flat one the motor need not be moved.

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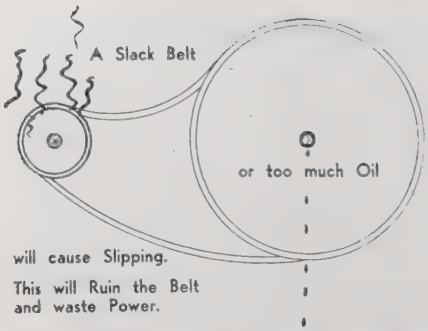


2. The tension on a belt should be such that when stationary it is just snug while with the load on it there is a slight sag on the loose side. Too much tension causes undue wear, too little may cause the destruction of a valuable belt due to slipping.

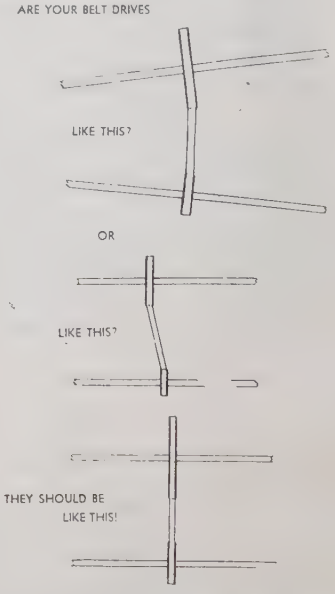
3. Keep oil away from belts. Oil is the enemy of efficient belt drives and care should be taken to see that excess oil from the vacuum pump does not run on to the belt when not running.

4. Make sure that all pulleys are in line and all shafts exactly parallel. Faulty adjustment of either of these points may cause much unnecessary wear and trouble. (Flat belts run to the side of the pulleys when the shafts are not parallel.) If the holding bolts of the motor or pump ever work loose, before tightening it is important to check the drive for tension and alignment.

5. If a belt slips seriously do not use makeshift dressings (for instance, the author has seen a slipping belt treated with treacle!) Tighten the drive immediately the fault is found.

Chain Drives.—The following rules should be observed for all chain drives:—

1. To keep a chain drive efficient adequate lubrication is essential.



2. Keep water away from chains.

3. Keep the tension such that when idle there is an inch or so of play parallel to the wheels.

4. Alignment of shafts and chain wheels is of the greatest importance.

Vacuum Pump

This is the heart of the machine and on it depends the performance of the other parts. If the following points are observed the vacuum pump will give trouble-free service.

1. Before every milking fill the lubricators with the correct rotary vacuum pump oil. Do not use separator oil or car oil or anything else that "might be handy." Make sure that the "wicks" in the lubricators are working properly. It is no good filling the latter if the oil does not go gradually into the pump!

2. Unless it is permitted by the manufacturer (as with certain makes of pumps) do not allow caustic soda solutions or boiling water to pass through the vacuum pump.

3. After milking there should be no sign of milk spray in the intake to the pump. The vacuum tank is not effectively baffling the passage of milk spray if it is passing through to the pump.

4. The bolts holding the end plates of a rotary pump should be kept

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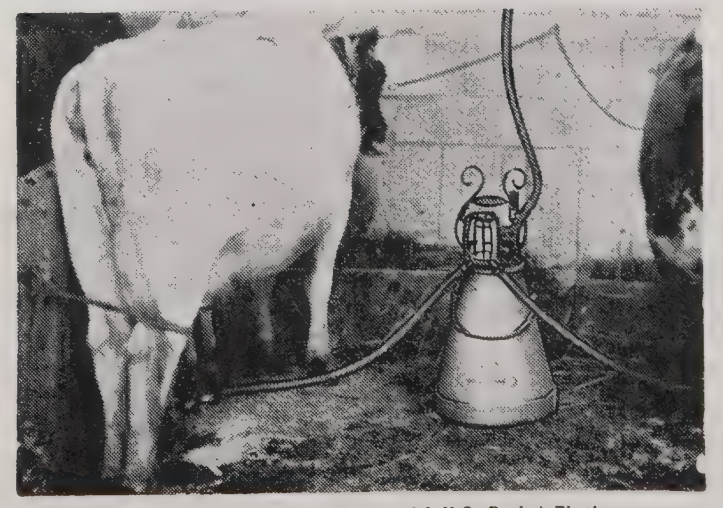

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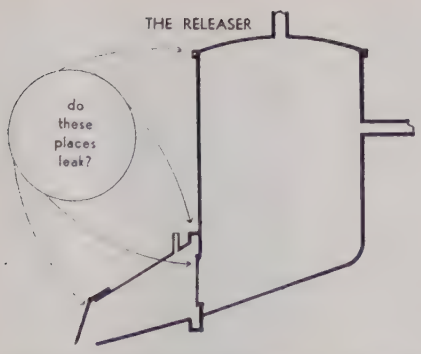


tight but do not force them. If tightening is needed apply light force to all bolts in turn so that pressure is applied uniformly.

5. Except in extreme emergency repairs to a vacuum pump should be made by an experienced mechanic. The development of a loud clatter might be due to lack of oil, worn blades, or broken springs. The first can be easily fixed. The other two faults require expert attention. Some pumps clatter a little when idling but are quiet when running under vacuum. This does not indicate a fault.

Pump Speeds

In order to get the most out of your machine make sure the pump is running at an adequate speed. If a bail has been added or the machine has been "doubled up" the pump will need speeding up. The following speeds are suggested as ensuring that with most plants there will be adequate air flow. These speeds apply to the standard 6 x 7½ in. rotary pump:—

2-cow plant	.....	200 r.p.m.
3-cow plant	.....	235 r.p.m.
4-cow plant	.....	260 r.p.m.
5-cow plant	.....	270 r.p.m.
6-cow plant	.....	290 r.p.m.

Vacuum Tank and Releaser

Trouble with these parts is usually due to faulty rings or flaps. Leaks due to perished rings or to flaps which do not seat properly are just as serious as a faulty vacuum pump. Rings and the soft rubber parts of flaps should be replaced once a season. Hard rubber flaps should be examined to see if they are seating properly. Leaks round the outside releaser flap cause milk spray to be carried into the air line via the releaser pulsator. Leaks round the inside flap will cause churning of the milk and excessive froth being carried to the vacuum tank.

Leaks are most easily detected by listening carefully or holding a lighted match near the suspected part.

Joints, Sleeves, Unions

Where rubber is used in joints it should be kept in good order. As relatively little rubber is required for rings and sleeves it is wise to change these once a season and so ensure tight joints. A yearly overhaul of all joints will greatly improve the efficiency of any machine.

Pulsators

Too much stress cannot be laid on the importance of keeping the pulsators in adjustment. This part of the machine is more likely to go out of adjustment than the rest of the machine and when it does so it will cause milking to be slow and incomplete The following points indicate the kind of attention needed to keep the pulsators in order. Though applying mainly to the mechanical type, the principles of the following points also apply to automatic pulsators:—

1. The drive should be lubricated once a week with a drop or two of oil (vacuum pump or separator oil will do) on all bearings. A small amount of oil regularly is better than a large amount now and then. Where grease cups are used these should be screwed down a turn or two once a week and refilled when necessary.

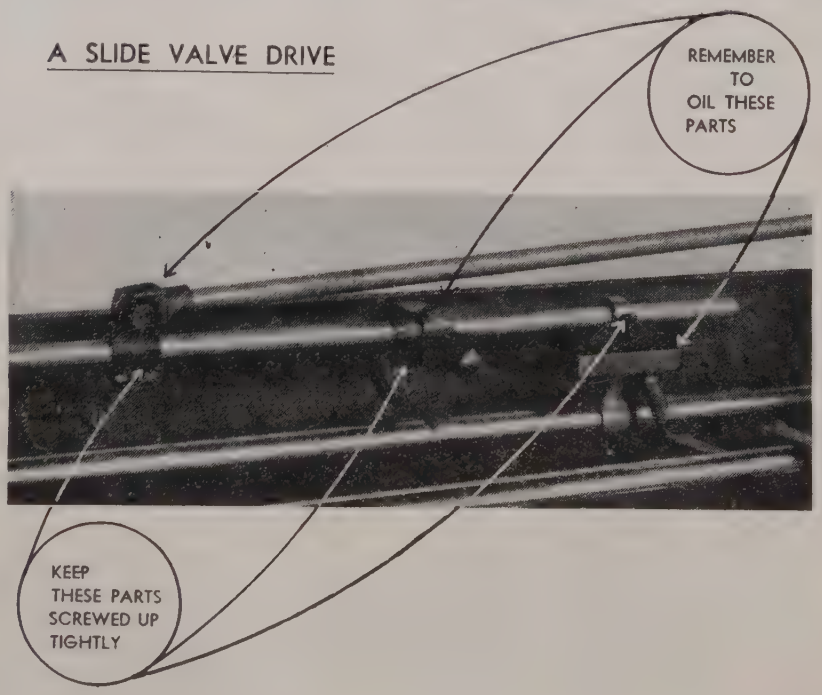
2. Any looseness in set-screws, driving collars, and other parts of the drive should be removed promptly.

3. Make sure the slides are set properly. In most slide pulsators the slide should just clear the port connected to the pulsator down-dropper in the middle of the squeeze phase. The further the slide moves away from this port the longer the squeeze phase. For most efficient milking the ratio of squeeze to release should not be less than 30.70 or greater than 50.50.

4. Brackets holding parts of the drive should be kept firmly screwed to the walls. Movement of such parts will cause faulty action.

5. Where belt drives are used these must be kept tight.

6. Open slides should be wiped with a greasy rag once a month to



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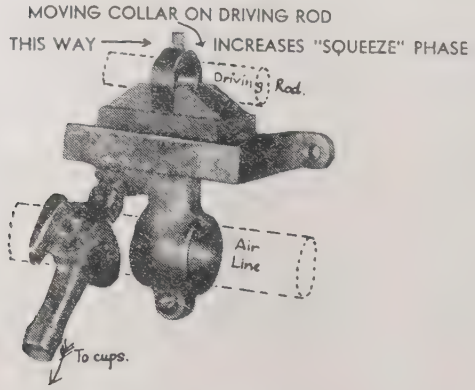
ADJUSTING A SLIDE PULSATOR



remove accumulated dust. A drop or two of oil once a week will ensure adequate lubrication. Too much oil must be avoided as an excess may escape into the air line or run down the droppers, so ruining the rubber air tubes.

7. The pulsator speed should be between 40 and 45 pulsations per minute.

8. From time to time the alignment of the pulsator slides and driving rods should be checked. Warping and twisting of wooden supports often causes the brackets holding the slides and pipes to move so that the drive or the slides become out of line with resultant uneven wear.

Relief Valve

A detailed article on relief valves appeared in the December, 1940, and January, 1941, issues of the "Journal of Agriculture."

The following are the main points about a relief valve which require attention. It should be pointed out that ball-type valves are unsatisfactory. Spring-loaded poppet or weighted valves are the most satisfactory.

1. Make sure before touching the relief valve that your gauge is correct.

2. At least once a season take the valve to pieces and clean it thoroughly, paying particular attention to the guide and the air inlet holes.

3. Give the spring a light coat of oil, assemble the valve, and put a drop of oil where the stem enters the guide.

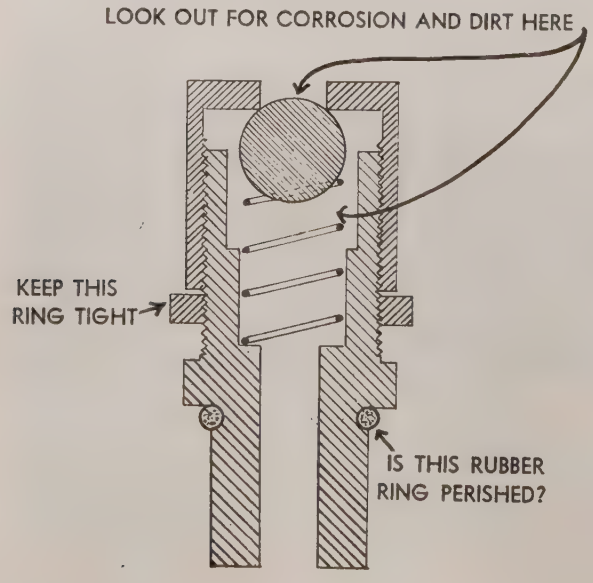
4. Replace the valve and adjust so that the vacuum does not exceed 15 in. (or preferably 14 in.) when the pulsators are running but the machine is not milking.

If buying a new relief valve get one of the weighted type or a poppet valve with a covered spring.

Vacuum Gauge

A detailed discussion on vacuum gauges appeared in the Journal of Agriculture, April, 1941. This article embodied a full account of the principles of and methods for adjusting vacuum gauges. The following points summarise the essentials in caring for this delicate part of the milking machine:—

A BALL RELIEF VALVE



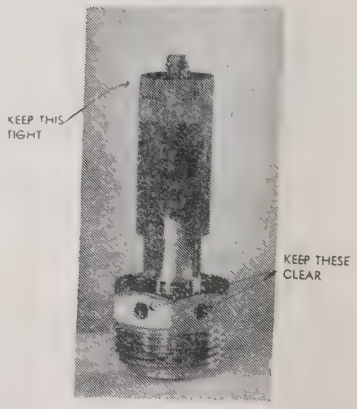
1. Have the gauge overhauled and cleaned up once a season and checked for accuracy at least twice a season.

2. When removing a gauge from the machine do not grip it by the body when twisting it, but use a spanner on the solid portion between the thread and the body of the gauge.

3. Never allow a gauge to be dropped or bumped.

4. When testing a gauge against a standard, hold it in the position it will be in on the machine. Position frequently influences the reading of a gauge.

A POPPET VALVE
WITH A COVERED SPRING



5. When possible the gauge and relief valve should be mounted independently on the air line. On single pipe machines the best position is either on the vacuum tank or between the vacuum tank and the releaser.

Teat Cup and Claws

Apart from the associated rubberware little can be done to extend the life of these parts of the machine. The following points are worth noting:—

1. Keep air admission holes clear. These should be inspected before starting milking,

2. Avoid using rings and cups which have become misshapen. It is often practical to bring a misshapen ring or cup back into shape. If this is not done the cups will leak and the inflations will slip and be subjected to irregular strains.

3. Keep rings, plugs, nipples, and the like thoroughly clean and well tinned.

Inflations and Tubes

Readers are advised to consult the articles on milking machine rubberware appearing in the Journal of Agriculture for June and July, 1942, and in April, 1943. The following are the main points to observe in caring for milker rubberware:—

1. The machine should be washed thoroughly twice daily with really boiling water and caustic soda or alkali mixture as recommended in the above articles.

2. Once a week all tubes and inflations should be soaked for some hours in a fairly strong hot soda solution. Metasilicate of soda used at the rate of one heaped tablespoonful per gallon of boiling water is recommended.

3. Where possible the tension should be released from inflations between milkings.

4. Stored rubberware must be kept in the dark in a cool place.

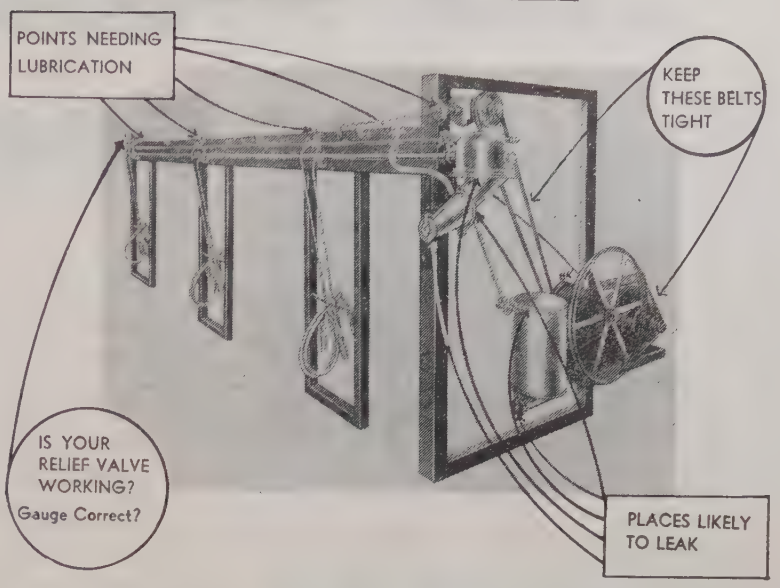
5. Never hang cups and tubes in the sunlight. Keep them in a shady place.

6. Do not use greasy teat salves before milking. If necessary, apply after milking and wipe the teats free from remaining grease before applying the cups.

7. Never use disinfectants containing chlorine.

8. During the off season rubber tubes should be removed from all metal nipples, etc., and cups should be dismantled so that the rubber can be stored in a cool dark place out of contact with metal. During storage tubes and inflations should not be kinked in any way.

A MODERN MILKING MACHINE



9. All metal coming in contact with rubber must be well coated with smooth tin or nickel plating.

Summary

The following is a schedule of things to do in order to get the best out of your milking machine. It is, of course, assumed that you follow the recommended cleaning methods.

DAILY.

1. Remove the tension from all inflations after milking.

2. Inspect air admission holes; see that the relief valve is working; note the gauge reading.

3. Fill the vacuum pump lubricator before each milking.

4. After milking hang the cups and tubes in a cool dark place. Do not let the tubes become kinked and keep away from oil or grease.

WEEKLY.

1. Inspect all drives and bearings.

2. Oil the pulsator slides and driving gear and wipe dust away when necessary.

3. Check the releaser, vacuum tank, and joints for leaks.

4. Check the pulsator slides for setting.

5. Dismantle the cups and soak inflations and tubes in hot soda solution.

6. Inspect bolts on the pump, setscrews, collars, etc., on the pulsator drive for looseness and tighten promptly if necessary.

AT LEAST EVERY SIX MONTHS.

1. Have your gauge checked.

2. Time the pulsators.

3. Examine all bolts and clean them up if necessary.

AT THE END OF THE SEASON.

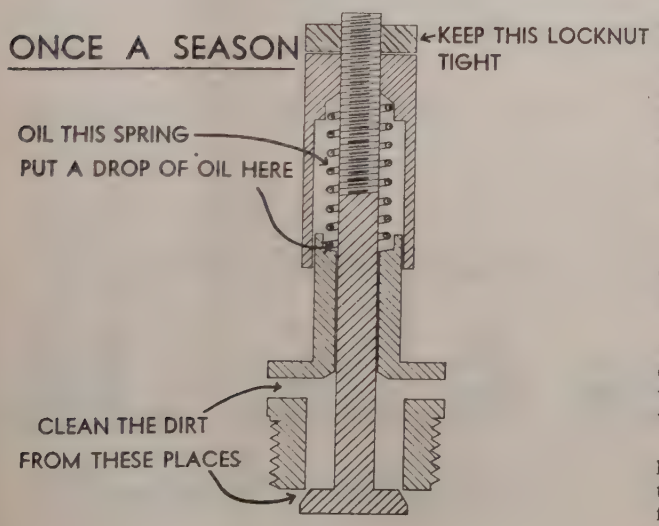
1. Take all cups to pieces and remove rubber tubes from metal parts and store in a cool dark place.

2. Take down all joints, remove rings and flaps from the releaser and vacuum tank. Replace all rings before the new season.

3. Overhaul the relief valve.

A POPPET RELIEF VALVE

WITH A COVERED SPRING



Acknowledgement

The writer is indebted to Mr. A. L. Bryant for his assistance in the preparation of the illustrations.

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A STUDY by Ohio State University of repairs on farm machinery showed that a large proportion of "wear and tear" replacements were due to insufficient lubrication, while breakage replacements were necessary because of failure to keep bolts tight. Proper lubrication and keeping bolts tight will help to prolong the life of your farm machines.

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Lucerne Growing in the Rotorua District

—By—
C. R. TAYLOR,
Fields Instructor, Rotorua.

Although lucerne is probably the best-known and most popular crop of its kind in the Dominion, it was not, until recent years, given much attention by farmers in the Rotorua district. There is now increasing appreciation of the value of lucerne for use in winter and periods of emergency, and this article covers the main points on lucerne growing in the pumice country.

THERE have always been odd growers of lucerne in the Rotorua district, but, generally, farmers in that district could not claim to be lucerne-minded.

This was not due in any way to general farming opinion being opposed to lucerne culture, but to the fact that, during the gradual development of the pumice-country by private enterprise, there appeared to be no actual place for lucerne as a supplementary fodder-crop.

At first sight, this may seem strange, especially to those unfamiliar with the bountiful nature of the pumice soil but when one considers the relative ease with which root crops were produced, and the density of temporary pastures, largely consisting of an abundance of red clover, wherewith to provide ample hay and ensilage reserves, it is hardly to be wondered at that so little thought was given to lucerne growing.

Trusting to Luck

As time went on, however, and the stage of farm development, particularly in the earlier-settled localities, reached more and more the permanent pasture phase, there appeared a tendency on the part of many farmers to plough less, manure more liberally and trust a good deal to luck. Needless to say this policy did not always have satisfactory results, as the comparatively long winter made the need imperative for a sufficiency of winter supplements to be always on hand for use in an emergency.

In certain localities, indeed, such an emergency might even arise during the summer period, and it is worthy of note that it is in these areas that the greatest advancement in lucerne culture has been made. But quite apart from this particular use for lucerne, it is a fact that on numerous occasions farmers in the Rotorua district have found in lucerne their answer to the difficult problem of adequately feeding stock during periods of low pasture-growth, without having to plough up permanent pastures any more than was absolutely necessary. Very largely on this account, lucerne is claiming the interest of additional growers each year.

Selection of Site

Owing to the physical condition of pumice soil, lucerne can be grown in most places with every chance of success. Provided drainage is reasonably good, and there is a fair amount of humus in the soil, particularly the topsoil, other factors essential to successful lucerne culture such as cultivation, lime and fertilisers can be readily provided as required.

Cutting the fourth crop of lucerne in February.

A two-year-old lucerne stand in the native development district of Horohoro, Rotorua.

A successful three-year-old lucerne stand of 10 acres in the Galatea district. Last year's stack is in the background.

The next point of importance in the selection of a site for lucerne is the avoidance, if possible, of areas that are likely to cause trouble from weed infestation. To follow a swede crop, for instance, with lucerne is generally to look for some difficulty, owing to the free growth of sorrel, spurrey and willow-weed that usually infest the average run of pumice country at this stage. Then again it would be unwise to choose a paddock with much twitch in it, for experience has clearly shown that, where the various grasses broadly grouped under the heading of "twitches" or "couch-grass" are at all prevalent, the life of a lucerne stand is often relatively short. Undoubtedly, the best site for a lucerne stand is a piece of old pasture, free from twitch and other troublesome weeds, offering good drainage and sufficiently level to facilitate the use of mower, sweep and other harvesting implements.

Cultivation

In the matter of cultivation, lucerne is just as exacting as any other crop, and consequently this work should never be skimped if good and lasting results are to be achieved.

Unlike many other soil types, however, the pumice soil of the Rotorua district does not require to be winter-fallowed for too long, otherwise much of the available plant food in the top six inches of soil will be washed away into the sub-soil by the winter rains and thus lost to the young, establishing, lucerne plants.

Ploughing should be commenced about eight weeks before the time fixed for the sowing of the seed. One rolling in the direction of the furrow should follow, and the ground then left until required for final cultivation. If a roller is not available, then give one double cut with the discs in the direction of the furrow, but with very little set on the discs. This latter point is important.

If the area is reasonably free from weeds of all kinds, the final preparation of seed-bed need not be undertaken until about ten days before sowing date. This work normally involves several discings with and against the furrow (with not too much set on the discs), a harrowing or two with tripod and chains, and finally a good rolling, if possible. The ground, when finished, requires to be finely worked and well consolidated.

Liming

Experience has shown that from 15 cwt. to 1 ton of lime is required per acre to give lucerne a good start in pumice country. This is best applied at the time of final cultivation, for it is then well worked into the top soil where it is given a good chance of being reacted upon by the soil moisture and becoming more readily available to the young plants and to the bacterial life that is so essential to the welfare of lucerne.

Manuring

Prior to the war the average amount of fertiliser applied per acre appeared to be in the vicinity of from three to four cwt.—usually the latter figure of superphosphate. Serpentine super, being neutral in reaction, will

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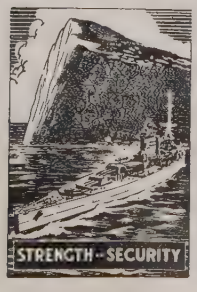

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not cause damage to inoculated seed as would super tend to do, and is therefore perfectly safe to actually mix with inoculated seed, either in the topdresser or the drill. But should super be used, it would be safer to mix the fertiliser thoroughly with an equal quantity of lime some days before being actually required, and then treat as for serpentine super.

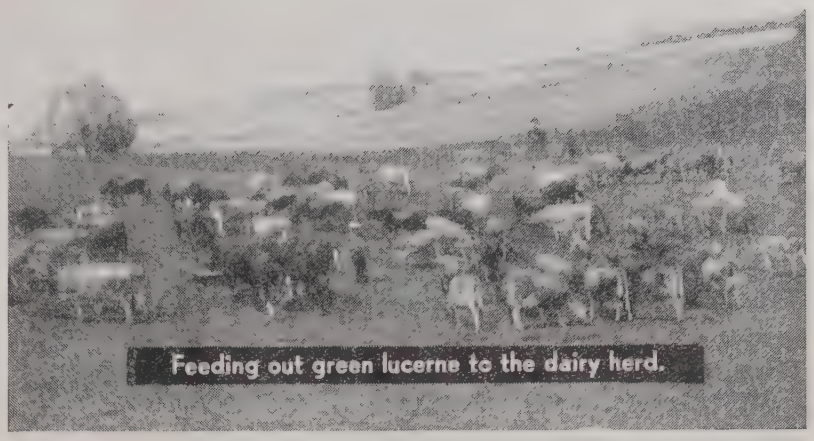
Inoculation of Seed

Put very briefly, the idea behind this comparatively simple, but highly essential, process is to ensure that the lucerne crop is provided with the correct type of micro-organisms to infect the roots and thus bring about a healthy development of root-nodules. Space does not permit of a discussion on this interesting subject other than to insist upon the utmost importance of doing the job thoroughly. Since full directions for use are supplied with every lot of lucerne-culture delivered to the farmer, it is not proposed to repeat them here, but it is earnestly suggested that they be read carefully, and the advice given acted upon.

Lucerne-culture is very cheap to purchase, and can be procured through all seed merchants. Carefully note that the culture is of a perishable nature, and therefore is not kept in stock, either by the merchant or the institution responsible for its preparation. In all cases, prospective growers of lucerne should give their merchant from ten to fourteen days' notice—this notice being that period immediately preceding actual sowing date.

Seeding

The seeding rate per acre varies considerably from district to district, but insofar as Rotorua is concerned, too light a seeding is not recommended, and seeding with from 15 to 18 lb. per acre when drilled in, and from 25 to 30 lb. when broadcast, is general. The variety known as "Marlborough" lucerne is definitely to be preferred to other types that are at present available.



Feeding out green lucerne to the dairy herd.

Generally speaking, it is customary for local growers to make a bare sowing of lucerne seed, but the writer knows of several excellent stands originally sown down with 4 lb. red clover (as cover crop) and 15 lb. lucerne. As the idea behind this practice is chiefly to smother weeds that would otherwise be likely to compete with the lucerne, it will be appreciated that, unless every care is taken to control the growth of the cover crop, there is every likelihood of the lucerne suffering the same fate as the weeds. However, with careful management, it is possible to establish lucerne in this manner where it would be difficult otherwise, especially where weeds are bad and the climate not the most suitable. But a tall-growing cover-crop like a cereal, for instance, particularly if very fast-growing, should be avoided.

Sowing Methods

For the sowing of lucerne, two methods are available to farmers—(1) broadcasting and (2) drilling. Both methods have given equally satisfactory results in the pumice country where all other essential factors have been complied with, and so it is not possible to favour one or the other specifically. The main points to watch when sowing are that the land is well consolidated and the seed not buried too deeply, although it must be properly covered.

Adequate cover is very important when dealing with inoculated seed, and for this reason it is preferable to sow on a cloudy day. Read carefully once again the instructions sent with the lucerne culture, for they have a definite bearing on sowing, and, therefore, on the success or failure of the crop.

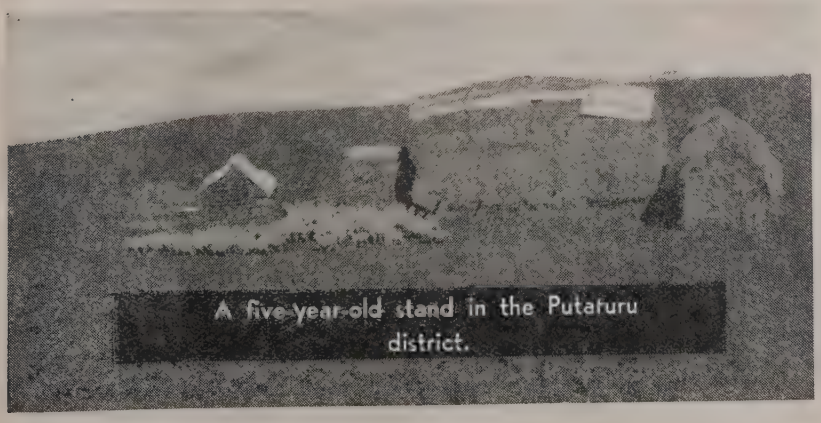
Time to Sow

In the Rotorua district, the best time to sow lucerne is from late November to late December. Very seldom is anything to be gained by sowing before the ground has thoroughly warmed up, for under such conditions it is usual for weeds and extraneous vegetation to make strong growth long before there is a similar move in the lucerne.

It is a far better plan to utilise the time of waiting in extra surface cultivation of the site, thus further reducing weed infestation, than to rush the lucerne in too soon, just because the ground happens to be ready for it. Many an otherwise splendid effort has come to nothing from this one cause alone; therefore haste should be guarded against.

First Year Management

Provided that a good strike has been secured and growth is satisfactory, the young lucerne will commence to flower in approximately two months from sowing. At this period an examination of the crowns of plants should reveal a fairly extensive growth of secondary shoots or buds. If these are present in goodly numbers, the first cut can be immediately taken; if not, delay cutting until the shoots appear, irrespective of the flowering behaviour of the crop. Young lucerne, especially, will almost invariably die out during the following winter if cut too soon.



A five-year-old stand in the Putaruru district.

Weeds are, of course, always a serious matter to be contended with in a lucerne stand, but never so serious as in the first season before the young plants have become thoroughly established. To a new grower of lucerne, it is often a heart-breaking sight to see what promised to become an excellent stand being rapidly covered with vigorous weeds like those of the amaranthus species, willow weed, red shank and fat-hen, and to him it appears obvious that the only thing he can do is to mow the field without delay.

In all too many instances this is the worst thing that could happen, for the young lucerne plants are cut before their time, and their subsequent growth is seriously retarded without the weeds being materially checked. Should there appear to be a possibility of the weeds seeding before the lucerne is ready to cut at the normal level, though this is very seldom the case, the mower-knife should be set as high as possible, and the weeds skimmed off 6 to 9 inches above the ground. If the infestation is really heavy, it requires to be raked off the field to prevent smothering of the lucerne.

Number of Cuts

In a favourable season a new lucerne stand in the Rotorua district may be cut twice and even three times before the close of the season. It is not possible to give precise instructions regarding the number of times lucerne should be cut, but in the first year, in the pumice country, the writer suggests two cuts at the most—one in February and the other at the end of March or early in April. This procedure would allow sufficient growth to be made after the second cut to assist the crop substantially through the approaching winter. It is a fatal mistake to mow lucerne closely late in the season and expect it to remain unaffected by the rigours of a severe winter. This refers particularly to a new stand.

There is normally no need to cultivate a lucerne crop in its first season. As a matter of fact, it is usual to find that more harm than good has resulted where cultivation, say, after the first cut, has been practised. Cultivation, where necessary, should be confined to the second year's management programme, but that is outside the scope of this article.

Use of Fertilizer

Should extra fertilizer be available, it is often a good plan to give a light topdressing of some phosphate after the first cut in February, but never at the close of the season unless the sowing of a cover crop of Algerian oat or Italian ryegrass on the established lucerne stand is contemplated. While this latter practice is quite successful in the pumice country, it is considered more suited to older stands, as it naturally involves fairly drastic surface cultivation in April to provide the requisite seed bed for the oats or ryegrass.

It should be emphasised that too much care cannot be given in the matter of seed inoculation and the subsequent handling of the seed up to, and during, the time of sowing.

Therefore, read carefully, and understand the simple directions sent with each package of culture before proceeding further with the job of establishing your lucerne crop. Many pounds of expenditure may be wasted, and much disappointment incurred, should this advice be ignored.

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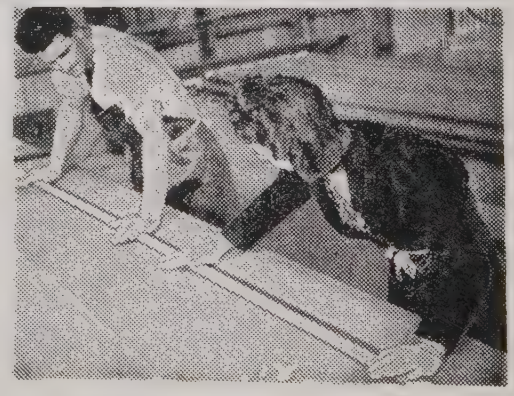

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Linen Flax Growing

During the brief period in which the growing of linen flax has been prominent in the picture of the New Zealand war effort, and the name of the plant has been on everyone's lips, a great deal of data has been collected on the raising of the crop. The subject is still one on which farmers and Government departments have to pool their knowledge, but in the light of post-war possibilities, the observations in the following article should be interesting generally, and instructive, as well, to those immediately concerned.

By

W. STAFFORD,
Irrigation Officer,
Timaru.

DURING the past three seasons linen flax has been grown on a commercial scale in the South Island, with varying degrees of success, and every endeavour has been made to collect data on the way crops behave during the growing and processing. Experimental work has been carried out, and soil and disease surveys made.

Prior to this, research and experimental work was carried out over a number of years, with small scale trials in possible growing districts in the South Island. Despite the great quantity of evidence available, however, one is yet unable to state with finality how to grow a successful crop of linen flax.

If the industry is to survive after the war, or even to persist in some districts during the war, it is necessary that every endeavour should be made to ensure that the flax produced is that required by the factory. When all is said and done, a crop is only as good as the quality and quantity of fibre it produces. The aim, therefore, should be to give to the factory linen-flax of high fibre quality and quantity, in order that such crops may be paid for at a rate which will compensate the grower for his labour.

Pooling of Knowledge

Linen flax is a crop in which farmers and Government departments have to pool their knowledge, and while this knowledge is by no means final, the quickest method to make improvements in the growing of a crop is by application of observations made over the last three seasons.

Here are some thoughts based on the results of observations. Linen flax has been grown with a varying degree of success throughout those districts of the South Island where arable farming is practised to a more or less extent. It has been the endeavour to establish it in places where crops demanding somewhat similar conditions are already growing.

Plant's Characteristics

In order to grow any crop, there must, in the first place, be some conception of what the plant looks like and what constitutes a good crop. The linen-flax plant belongs to the genus *Linum*. It is an annual, and has been cultivated for its fibre and oil properties for thousands of years. Under suitable conditions, it is a single-stalked plant, growing on an average from two to three feet in height, branching near the top, and with white or blue flowers according to the variety. After flowering, the seed capsules, which are called "bolls," appear. These bolls contain up to 10 seeds. The leaves, which are alternate on the stalk, are lanceolate in shape.

Crop Quality

As far as the growing crop is con-

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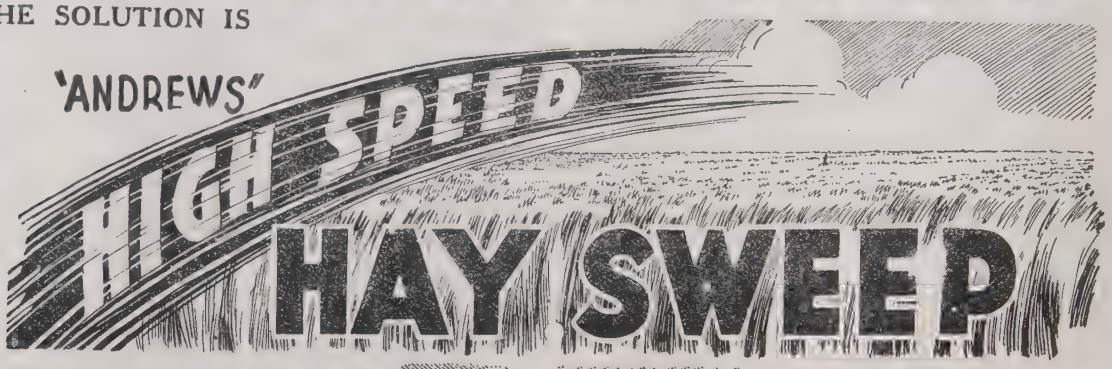
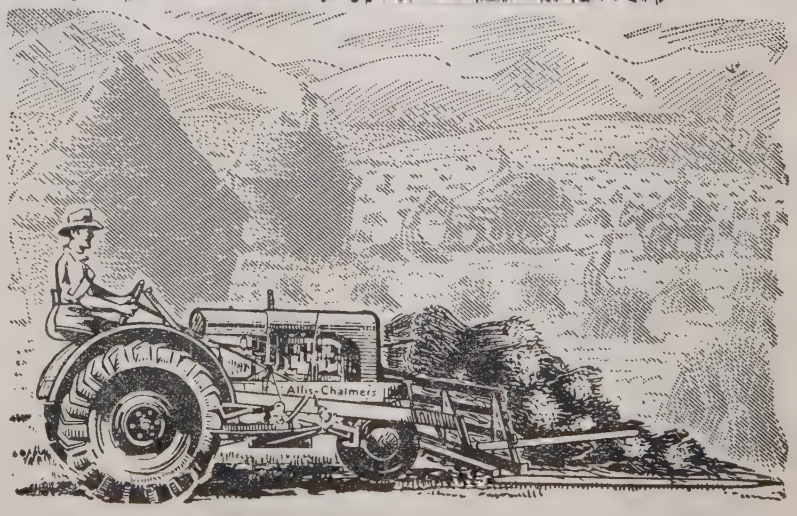


The Andrews Sweep does the work of a full team of men, drays and horses carting from the paddock to stack or thresh.



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cerned, it must be remembered that what has been considered a good crop of flax by the grower is not necessarily considered one by the factory. When straw is bought at a price per ton, the farmer thinks in tons per acre immediately; the more tons the greater the return. The factory, however, thinks in terms of fibre; the yield of fibre per ton of straw, and the quality of the fibre. More and more must it be brought home to the grower that he must produce the crop the factory wants.

On the results of processing have been established standards by which growing crops may be judged. These are some of the standards required in a good crop of linen flax:—

It must have length to produce length of fibre.

It must be even in height over the field.

The plants must be of the desired stem diameter, each identical with the next, having single, straight, unbranched stems.

The roots must be straight and long.

The straw colour must be that which will add to, and not detract from, the colour of the finished fibre. This is a golden to milky-white colour in the ripening plant.

The fibre content of the plants must be high. This feature, up to the present, is judged in association with straw colour.

The crop must be free from weeds, disease, lodging and damage.

From failures and successes in districts, and within districts, much can be learnt, and steps can be taken to overcome difficulties. An examination, as under, of the important factors affecting the linen flax crop may give a clearer picture.

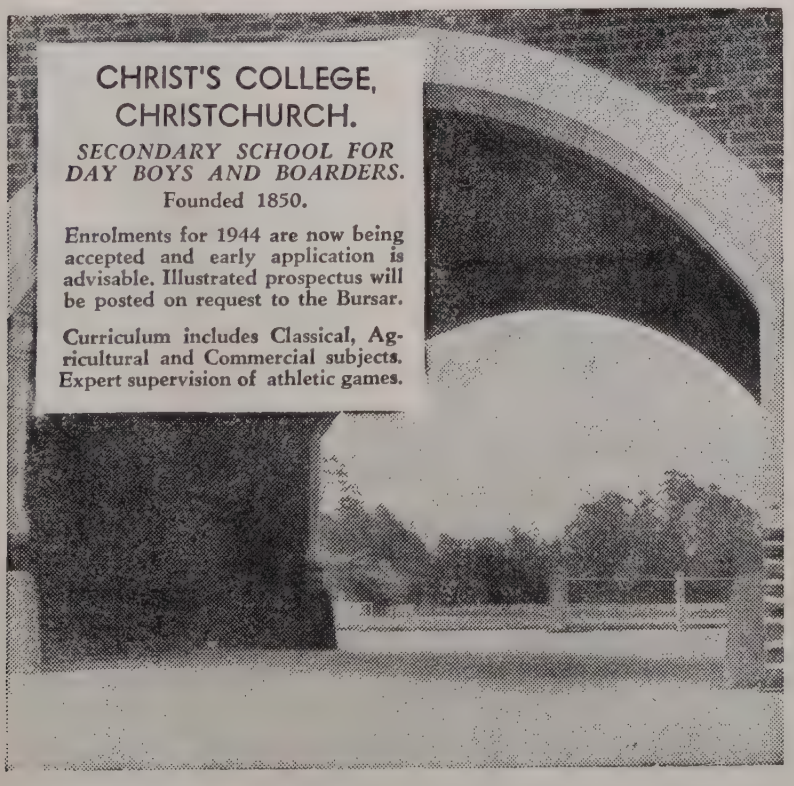
Climate

Linen flax demands quick growing, early ripening conditions. Early sowing in all districts should be the rule, in order to take full advantage of whatever growing and ripening conditions are available. It is realised that late sowings have been successful, but, by comparison, there have been fewer failures with early sowings. Harvesting is, in the main, more easily carried out with early-sown crops, the feature of late crops being what may be termed a false ripening of the plant, in which the seed bolls often ripen before the leaves fall. After that, the plant takes on a fresh greenness, making processing difficult.

The Land

Three features about the land are clear cut. Firstly, it must be such that the crop can be harvested. A puller will not work on nearly as steep a slope as a binder, while stones lying about the surface of the ground make pulling impossible.

Sample of good linen flax straw showing plenty of length and absence of branching.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Secondly, the land must be clean. The most objectionable weeds are Fathen, Californian and Scotch thistles, wild oats, wild turnip, yarrow and cornbind. These make pulling difficult. They interfere with the conditioning of the flax in the stook, being green when the crop is pulled. Above all, they are not eliminated in processing, and lower the value of the fibre. If present in quantity, weeds necessitate the rejection of the crop for fibre purposes. Lower-growing weeds, such as twitches, pimpernel, spurrey, catsear, and wire weed, prevent successful establishment of the crop.

Thirdly, the land must be as even in character as possible, in order to avoid extremes of growth and ripening, which tend to produce unevenness in the crop, which is undesirable from the retting and scutching viewpoint.

Apart from the foregoing, linen flax can be, and has been, grown over a wide range of soils. The limitation on the light side is a medium silt loam in the lighter rainfall areas, while that on the heavy side is determined more by the state of fertility. That is, on heavy land the fertility must be in a reduced state, so that lodged rank growth is avoided, such crops having

proved to be low in fibre-content and quality. The ideal type of soil is undoubtedly a medium clay loam overlying a clay subsoil, such as is found on the clay downs of Canterbury and Otago.

Place In Rotation

Again in this feature a clear-cut negative stands out. Flax often does not succeed after fed-off crops of rape, turnips, swedes, or other allied species. Apart from this, flax can be grown in any place in the rotation. Up till the present, the majority of crops have been grown on land ploughed out of grass—very often old browntop and creeping fog, or run-out, useless pasture. A further large proportion has followed cereal crops, while the remainder have been grown after miscellaneous crops such as peas. There appears to be no set place in the rotation which can be stated as being correct. Its actual place depends on the fertility of the land and the manner in which it has previously been farmed, and this will be dealt with later.

Land Preparation

By far the biggest proportion of linen flax is spring-sown, thus necessitating more care in the preliminary preparation of the land than in the case of autumn-sown crops. Where linen flax is sown on the lighter types of soil, there is some justification for autumn sowing, but where it is grown on what has been mentioned as the ideal soil type, that is, a medium clay loam, autumn sowing is not warranted.

It is safe to say that many linen-flax crops are sown on inadequately prepared land. In preparing the land for a crop of flax, the object is, up to a point, the same as for any other crop—that is, to render whatever fertility there is in the soil available to the plant, and to provide a satisfactory seed-bed suitable to the plant's habit; but it should be remembered that the plant is a dicotyledon, that is, the seedling has two leaves, and as such demands a finer, firmer and more weathered seed-bed than monocotyledons, such as wheat, oats, or ryegrass. This means that the final ploughing must be done early, as is the case for turnips and rape, to allow weathering and sweetening of the soil.

Methods and Times

For spring sowing, in the effort to make fertility available, early skim-ploughing or hustling in April and May, followed by top-working with hustler, or grubber and drag or grub harrows at frequent intervals, should be carried out. Deep ploughing, such as will thoroughly dispose of turf or other crop residue, should be done if weather permits, not later than the middle of August.

The ground should then be left in the furrow until a fortnight from sowing, when it should be top-worked down to a fine, firm seed-bed. It is absolutely necessary that in the top-working the previously ploughed-down turf or other crop residue should not be brought to the surface, otherwise the seed-bed will never be satisfactory. This means, of course, that provided the depth of top soil allows, the deeper the ploughing the better, since deep top-cultivation can then be carried out. The ground should be rolled prior to sowing.

It may be noticed that no mention has been made of the use of discs. This implement is resorted to only when the working of the ground has been late, insufficient and poor. The idea that flax can be grown on deep ploughing only, disced to a seed-bed, has been proved incorrect.

Sowing and Manuring

Sowing should be early for the particular district. After three seasons' experience there is still no better

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practical way than in 7 inch rows through the ordinary grain drill. Variation in the thickness of the plants in a large proportion of crops is a detrimental feature, and it is thought, with some justification, that the crowding of plants in narrow rows due to the heavy seeding necessary to obtain yield per acre, is the cause. To overcome this, broadcasting of the seed has been tried, and experiments with shovel coulters to widen the seed band are being made.

It has been observed, however, that only where the soil conditions are unsatisfactory, either physically or through lack of fertility, do unevenness in straw thickness and crop-height occur, together with excessive branching. Where soil conditions and fertility are good, these uneven features and "stag plants" do not occur to any extent, even when the crop is sown in 7 inch rows. The rate of seeding can vary from 70 to 100 lb. per acre. It depends on the soil type, condition of the land, and previous crop. Each field varies, and local knowledge best determines the actual amount to sow.

The drilling should be shallow, as for rape or turnips. One cwt. of superphosphate per acre should be sown with the seed. Lime is not necessary. After drilling, the ground should be harrowed sufficiently heavily to take out wheel and coulter marks. This is essential, since, if rain falls prior to the seed coming through the ground, fine soil is washed into the trough of the coulter marks, and forms a hard layer along the seed row, making it difficult for the seed to come through evenly. This condition is much more detrimental than the usual crusting of harrowed ground which takes place after rain.

Fertility

In the paragraph "Place in Rotation," the following statement was made. "Its actual place depends on the fertility of the land and the manner in which it has previously been farmed." Linen flax demands quite a different state of fertility from other crops. If a quality crop is to be produced, there must be an even balance in the available plant food. Our ideas in producing good crops of other species of plants have been to restore the nitrogen content of the soil to as high a pitch as possible, then to let the other foods catch up on it in the growing crop. To do this in the case of linen flax is fatal. The nitrogen content of the soil must only be sufficient at the most to make full use of the other necessary foods. This, of course, is the reason why the crop does so well on browntop country when the soil is well worked.

It can be seen, therefore, that in growing linen flax on well-farmed, arable soil, care has to be taken in the selection of the crop it is to follow. It can be said that it should never follow one which tends to raise the fertility of such soil.

Varieties

There is, unfortunately, little information available regarding the suitability and adaptability of the varieties at present being grown in the country. Opinion based on observation changes from season to season. Few districts have had the opportunity to try out all the varieties on a field scale. This has been due to meagre supplies, the necessity for building up stocks, and the difficulties associated with maintaining purity of variety.

In the first season, the following varieties were grown:—J.W.S., Concurrent, and Liral Crown, the latter in Marlborough only. All three did well, but Liral Crown was, on its behaviour in Marlborough, probably the best. As the results of a further two seasons' experience, an extension of Liral Crown into other districts, and the testing out of further varieties, this opinion is now open to question.

Approximately 100 acres of Liral Prince were sown last season, and experiments are being made with other varieties. Probably more varieties have been sown in South Canterbury than elsewhere, and the results of observations on how they have behaved in this district may be of some interest.

J.W.S.

This variety was sown in the first season, as no other seed was available in sufficient quantity to sow the area acquired. It did much better than was expected, and in quite a number of

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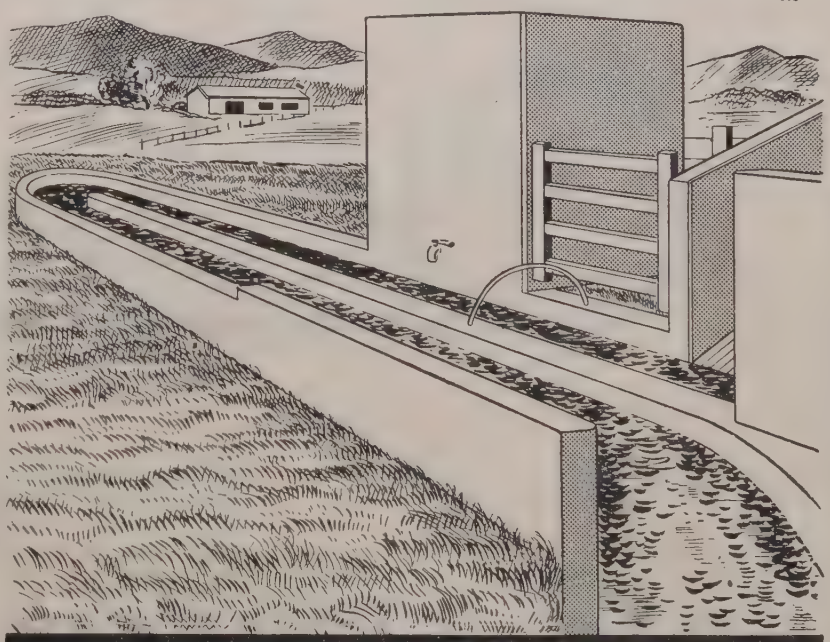

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cases gave good fibre results. It is a blue-flowered variety, though it is not included in the general term "Blue Blossom." The disadvantages of the variety are that it is naturally finer, shorter and more branched in the straw than the more improved fibre varieties. As a result of its fine straw it is easily lodged.

Concurrent

The most widely distributed at present, this is one of the White Blossom varieties. Concurrent has done well, and can be considered a suitable variety under any conditions. It has proved more adaptable than the Blue Blossom varieties to all classes of soil. It ripens slowly, and, therefore, harvesting can be carried out over a longer period. It does not deteriorate when left standing to the same extent as do the other varieties. Its disadvantages are that it is shorter in the straw than the Blue Blossom varieties, and tends to more branching, while the fibre is usually harsh and coarse in quality. Therefore, it does not produce as even a crop. There is also a tendency to produce more "stag plants" under indifferent conditions.

Liral Crown

This is one of the Blue Blossom varieties, and it has given results justifying extension of the area devoted to it. It has, however, this season been more susceptible to rust than some of the other varieties, and for this reason its claims to prominence have been somewhat weakened. It ripens from 7 to 10 days before Concurrent, and harvesting must be undertaken at the right stage.

It has been found, however, that discolouration, which occurs in Liral Crown, and which one is inclined to view as the chief factor in deterioration, due to improper harvesing, disappears on retting with this variety more readily than does a similar amount in the Concurrent variety. Its long, unbranched straw, with high quality fibre-content, makes it such that it cannot lightly be discarded.

Liral Prince

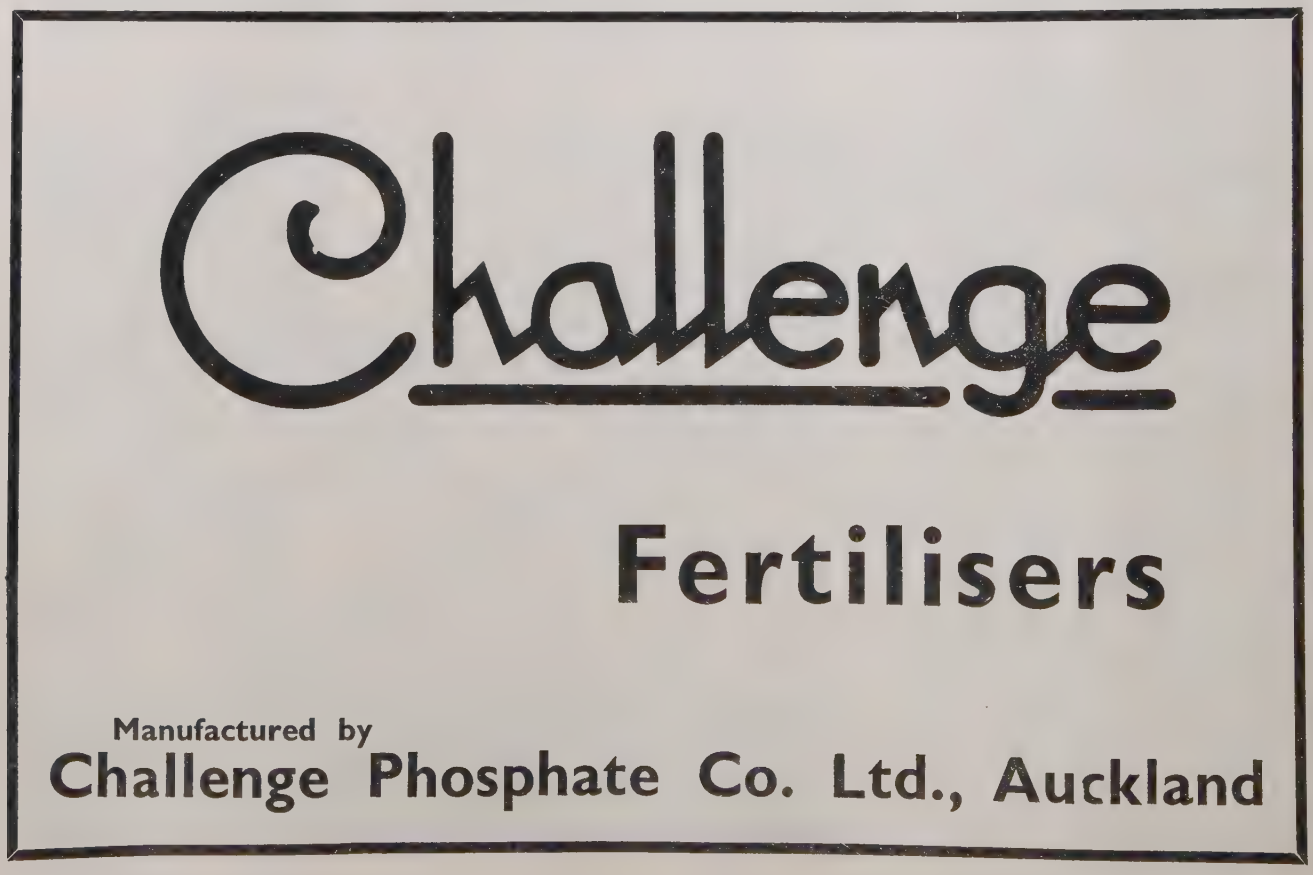
This is also one of the Blue Blossom varieties. During the 1941-42 season, 20 acres of this variety were sown with the object of increasing the seed supply. In the 1942-43 season, areas were placed with selected growers, and the results are very promising. Liral Prince is difficult to distinguish from Liral Crown, but appears less susceptible to rust. It matures about the same time as Liral Crown, and is undoubtedly high in quality and quantity of fibre. Like Liral Crown, it deteriorates rapidly if left standing for long after ripening.

Liral Prince and Liral Crown seem to demand more careful treatment and a keener appreciation of the needs of flax by the grower, both in growing and harvesting. One can imagine their use not being extensive until the flax crop becomes an integral one in the farm rotation. Then they will, undoubtedly, be the chief varieties grown.

The Grower

Experience is required to grow good crops. For the successful establishment of the industry, farmers are required who will fit flax-growing into their rotation and grow a reasonably regular acreage from year to year. It is not in the interests of fibre-production for flax to be used as a "breaker-in" of land. There is no other farm crop over which the farmer can have so much influence, either for good or bad.

With the farmer lies the power to produce a good crop. A good farmer will produce a good crop on poor soil. A poor farmer will fail on the best of soils. To use the right implement at the right time, and to know when a field is fit to sow is second nature to some; to others, a sheer impossibility.



Since man is dependent to a large extent upon animals for his food supply, three sets of workers—medical officers, sanitary inspectors and veterinarians—operate in allied fields to prevent the danger that would otherwise be a constant peril, of people becoming infested with diseases that affect livestock. There is a point at which the work of these specialists merges into a common task, and their success as a team in the preservation of public health depends largely on the support and understanding of the public, and, in particular, on the co-operation of farmers.

Animal Diseases and Public Health

— By —
M. C. ARMSTRONG,
B.Ag.Sc., B.V.Sc.,
Veterinarian, Masterton

THE FARMERS whose co-operation is important are not only those selling dairy produce, but, in addition, those with house cows. As a matter of interest, as well as of value in public health, everyone should know something of those diseases of live-stock likely to cause human infection. Accordingly I intend to give a brief outline of those diseases of animals that have a comparatively high incidence of transmission to man.

The diseases to be considered are: Contagious abortion of cattle and undulant fever of man; bovine tuberculosis and non-pulmonary tuberculosis of man; hydatids in the dog; bovine mastitis and septic sore throat infections. Let us not forget that many other diseases such as anthrax, actinomycosis, ringworm, and many types of phlegmons, furuncles, and blood poisoning can infect man by transmission from animals.

Contagious abortion and its relation to undulant fever of man: Contagious abortion or brucellosis is the most widespread disease of dairy cattle in New Zealand. Specific blood-test results show that 30 to 40 per cent. of all dairy cows are positive for infection, while bacteriologists estimate that 5 to 10 per cent. of all cows secrete brucella abortus germs in the milk. The report of the Director-General of Health on undulant fever in man records that 27 cases were notified during 1939 in New Zealand.

The disease in cattle: Cattle can be infected by the causal organism, brucella abortus, mainly through the ingestion of contaminated food and water, although infection is possible also through the inoculation of skin wounds or the eyes. As the common name of the disease indicates, the course of the disease has a strong sexotropic tendency. Subsequent to the infection of a pregnant female, the germs become established in the uterine wall and placenta, leading, ultimately, in about 80 or 90 per cent. of cases, to a premature expulsion of the foetus—in other words, abortion.

Premature birth is a major symptom, and its constancy depends entirely on the stage of gestation or pregnancy when infection took place. It is possible that an animal infected later in pregnancy will calve in an apparently normal manner at full term. An infected animal is, therefore, of the greatest danger to healthy animals at the time of calving, either premature or normal, by means of the grossly infected afterbirth and the associated discharges, and the calf itself.

Invasion of Udder

After evacuation of the uterus, the germs migrate, via the lymphatic vessels, to the udder. Hence, in as short a period as six weeks after calving, it is most difficult to find germs in the uterus unless total or partial retention of the afterbirth occurs. Invasion of the udder leads to no actual change in its tissue that can be detected clinically. Having established themselves in the udder, the germs remain for the animal's life, being excreted intermittently in the milk, and undergoing a periodic backward migration to the pregnant uterus.

Satisfactory infection of cows can occur only when they are sexually mature. If an animal is not pregnant, but possesses a lactating udder, the germs establish themselves in it directly. Thus, we find that contagious abortion in cattle is a focal disease, primarily affecting the sex organs, giving rise to little or no systematic upset, the affected animal appearing to be in good health and normal in every way to within a few hours of actual abortion.

Observations show that 80 or 90 per cent. of infected cattle, having aborted once will generally calve normally afterwards, a fact of utmost importance. The reason why cows do not abort a second time is that a certain amount of immunity to the organisms has been formed and the cow can now carry the calf and infected membranes to full term.

Vaccination

An appreciation of this fact has led to a considerable amount of experimental work to produce a vaccine for sexually immature cattle. The development of an artificial immunity in virgin heifers following vaccination with an attenuated live culture of brucella abortus is now being actively pursued.

As neither treatment nor prophylaxis can be regarded as satisfactory, other control measures have to be adopted. Owing to the very high incidence of this disease, especially in carrier form, an eradication programme based on the serum agglutination, or blood test, would be a tremendous undertaking.

Considerable control of the spread of infection can be attained by strict herd management, which means complete isolation and disinfection of the aborted animal until all discharges have cleared.

Relation to Undulant Fever of Man: At the end of the last century, when Bang was proving to the world the true aetiology of contagious abortion, Bruce was completing his ultimately successful investigation into a disease that at that time was thought to be confined to the Mediterranean littoral. This disease was called Malta, or Mediterranean, fever, and infection arose as the direct result of the ingestion of milk obtained from what appeared to be healthy goats. This disease of man which will last from 3 weeks up to 2 years was later known as undulant fever, as there is a periodic rise of temperature due to a general

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invasion of the blood-stream and system. It was found that 50 per cent. of the goats were infected with a mild abortion disease caused by **brucella militensis** which appears in the milk.

Thus we have two specific types of disease, one of cattle and goats, where the germs become localised in the sex organs, and the other of man, where no such localisation exists, but the germs invade the blood-stream to cause an intermittent fever.

Group of Bacteria

Struck by the resemblance between the germ of contagious abortion of cattle and that of Malta fever of goats and humans, Alice Evans, in the United States of America, undertook a detailed study of their varied behaviour under strict laboratory conditions. So close did she find the relationship that it is most difficult, except under very rigorous and detailed biological methods, to differentiate in the slightest degree one from the other. The two germs are now classed together in a special group of bacteria known as **brucellae**, being referred to individually as **br. abortus** (cattle) and **br. melitensis** (goats).

When susceptible goats are infected with **br. abortus** or **br. melitensis** the germs show the same identical sexotropic character. A study of the effects of each germ on man, however, shows that **br. melitensis** is highly infective for man. Few bacteriologists working with freshly isolated strains manage to escape infection, while **br. abortus** seldom causes laboratory infection. The outstanding difference between the germs is not one of kind, but one of degree, **br. melitensis** being virulent for man, while **br. abortus** is only slightly so.

Further Research

Twenty years ago, Alice Evans showed conclusively that a sporadic case of illness in a human simulating Malta fever was caused by **br. abortus** of cattle, and a large amount of work has been done since on similar cases, to determine a similar infecting agent. Within recent years research in almost every country has shown that undulant fever of humans caused by **br. abortus** in the milk of contagious abortion cattle is a widespread reality. It is responsible for the causation of many ill-defined fevers of the influenzal type.

Considering the large number of people drinking raw milk in New Zealand, why do so few definite cases occur? We may be fortunate that a certain degree of tolerance has been established in our systems from strains of low virulence for men. In addition, it is known that milk may contain certain specific protective substances. Among certain authorities there is some difference of opinion as to the relative percentages of infection in this disease derived from raw milk as against contact infection through handling cattle. Although direct contact with infected material causes a fair incidence in veterinarians, stockmen, and bacteriologists, there appears to be an ever-increasing volume of evidence which proves that human infection via contaminated milk must be regarded as a fact.

Control of transmission: The susceptibility of br. abortus germs to heat suggests that the treatment of milk by pasteurisation would remove any danger. Since eradication, treatment, or prevention of contagious abortion of cattle may take many years, a system for control of undulant fever, based on the treatment of milk, may be justified.

Bovine Tuberculosis

The disease of tuberculosis in mammals is caused by three distinct strains of organism, viz., human, bovine, and avian. Humans are almost solely infected with the human and bovine strains, and it is my intention to deal only with the bovine strain of infection.

Bovine tuberculosis is the most feared disease conveyed by milk, and milk is the chief vehicle of infection to man, pigs, cats, and dogs. In England, it is responsible for an estimated 2,000 deaths annually, while 5,000 fresh cases, chiefly in children, occur each year. The majority survive, but infection results in severe crippling and other serious illness. In New Zea-

Slaughterings of Stock

THE following returns of slaughterings of stock at meat-export slaughterhouses and abattoirs for the months May to November, 1943, have been compiled by the Livestock Division:—

District.	Cattle	Calves	Sheep	Of which Ewes were	Lambs	Pigs
North Island.						
Meat-export Slaughterhouses—						
Auckland	109,629	571,834	95,876	39,698	138,977	85,090
Poverty Bay-Hawkes Bay	23,598	58,098	75,293	34,309	192,930	12,035
Taranaki-Manawatu ..	55,705	197,500	51,766	26,912	174,238	52,947
Wairarapa-Wellington ..	21,068	27,873	57,602	27,905	126,452	10,233
Totals	210,000	855,305	280,537	128,824	632,597	160,305
Abattoirs	82,138	24,105	394,591	165,725	56,182	27,374
North Island Totals ..	292,138	879,410	675,128	294,549	688,779	187,679
South Island.						
Meat-export Slaughterhouses—						
Nelson-Marlborough ..	1,481	10,546	7,393	4,552	38,053	5,257
Canterbury-Westland ..	8,349	33,989	138,895	111,933	341,517	17,949
Otago-Southland	9,792	35,379	76,699	62,696	569,592	3,172
Totals	19,622	79,914	222,987	179,181	949,162	26,378
Abattoirs	34,382	6,805	165,932	96,463	20,944	8,695
South Island Totals ..	54,004	86,719	388,919	275,644	970,106	35,073
Dominion.						
Meat-expt. Slaughterhouses	229,622	935,219	503,524	308,005	1,581,759	186,683
Abattoirs	116,520	30,910	560,523	262,188	77,126	36,069
Grand Totals	346,142	966,129	1,064,047	570,193	1,658,885	222,752
Same Period, 1942— Meat-export Slaughterhouses and Abattoirs ..	406,379	970,998	1,000,150	535,472	1,777,279	291,253
Same Period, 1941— Meat-export Slaughterhouses and Abattoirs ..	305,999	989,607	958,085	552,681	2,001,134	361,467

Slaughterings of Pigs

The 58,509 pigs slaughtered at meat-works and abattoirs during the month of November, 1943, were distributed in weight ranges, approximately, as follows:—

Up to 60lb.	67
61 to 120lb.	10,468
121 to 160lb.	37,418
161 to 180lb.	6,747
Over 180lb.	2,269
Sundries	1,540
	58,509

The grading of porkers was 91 per cent. of first quality, 9 per cent. of second quality; and that of baconers was 79 per cent. of prime 1's, 16 per cent. of prime 2's, and 5 per cent. of second quality.

In the different weight ranges the grading was as follows:—

121-160	81%, 15%, 4% of P1's, P2's and 2nds respectively.
161-180	66%, 25%, 9% of P1's, P2's and 2nds respectively.

land, there are no reliable figures available for the incidence of bovine tuberculosis in humans. It is known that approximately 6 to 9 per cent. of our dairy cattle in New Zealand are affected with some degree of tuberculosis.

The disease in animals: The animals most commonly attacked are cattle, pigs, cats, and dogs. It is very rare in horses, and only of classical occurrence in either sheep or goats. The chief method of infection in pigs, calves, cats, and dogs is by the ingestion of diseased milk or of food contaminated by the germs from saliva or dung. In adult cattle, it is considered that the chief method of infection is by the inhalation of fine drops of sputum coughed up by animals with pulmonary lesions. Recent information based on successful eradication by tuberculin testing indicates that animals with no obvious clinical symptom can be potent sources of infection for healthy adult cattle by means of saliva and dung from active throat and intestinal lesions. Congenital infection is rarely, if ever, seen in both animals and man. The disease is therefore seldom found in bobby calves at slaughter.

Lymph Glands

In the animal body the bacilli are spread primarily by way of the lymph system, and if it succeeds in passing the regional lymph glands, it may be carried far, but always in the direction of the lymph flow towards the lungs. The role of the lymph glands in tuberculosis is very important, since they arrest for a considerable time the spread of the tubercle bacilli which otherwise would be continuous and rapid. Latent or dormant tubercular lesions exist in cattle, as in man, and there is considerable danger that in cattle these lesions may light up and become active and progressive.

This is very likely to occur during a period of feed shortage, or as a result of other diseases. In Europe, it has been found that 2 to 6 per cent. of infected cows have udder lesions. It is also known that one part of milk from a cow with tuberculosis of the udder, when diluted in 100,000 parts of non-tubercular milk is capable of infecting guinea pigs. Therefore, one cow with udder tuberculosis may be capable of infecting the mixed milk of a large herd. Udder tuberculosis in New Zealand is not common, since all estimates are well below 1 per cent.

Infected Milk

A most important observation, however, that has been confirmed in various parts of the world, is that cows affected with tuberculosis, but whose udders were free of lesions, are able to excrete tubercle bacilli in the milk, often intermittently. Thus, any tuberculous cow is a potential source of infected milk, and here lies the danger, especially of individually infected house cows. As noted earlier, man is infected chiefly from the ingestion of milk, and lesions are developed in the throat, intestines, bones, and joints—

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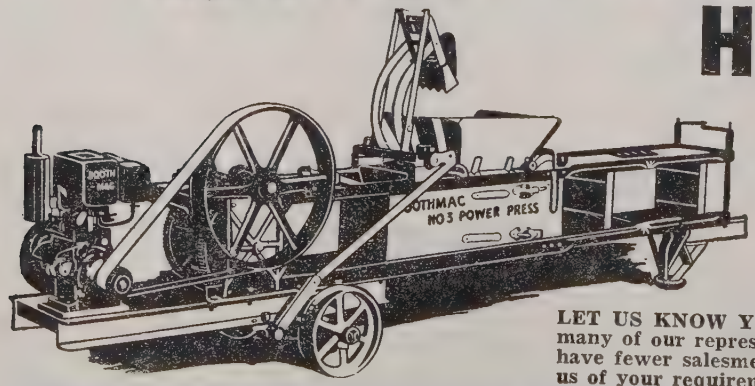

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non-pulmonary forms. W. H. Park, at the 5th International Union against Tuberculosis, stated: "After studying reports and statistics from all parts of the civilised world, I am satisfied that a conservative estimate of the danger of bovine tuberculosis to humans would be that 25 per cent. of tuberculosis of children and 5 per cent. of all tuberculosis in humans is due to infection with germs from milk."

Although figures show that the complaint is responsible for a small percentage of human deaths, it must be remembered that it causes a considerable amount of crippling and chronic non-fatal disease.

Control of transmission: There is no doubt that efficient pasteurisation makes milk safe. If the reductase test for dirt bacteria is applied to supply milk before pasteurisation, there can be no objection that it will put the clock back on clean milk progress. A programme of eradication of all diseased cows, based on the application of the tuberculin test by qualified veterinarians, is the only feasible way to handle bovine tuberculosis in both animals and man in a modern country. The tuberculin test is highly specific, and the absence of naked-eye lesions on postmortem as sometimes happens, is no justification for the assertion that the animal is unaffected, as only a thorough and complete biological examination of all the lymph glands can furnish the answer. It should be regarded as evidence of the searching effect of tuberculin in detecting a small focus rather than an indication of fallibility. On many farms in New Zealand the disease has been entirely eradicated by two applications of the test. More voluntary co-operation from farmers in this important work would be very welcome.

Hydatids

During 1939, there were 30 cases of hydatids in humans notified in New Zealand.

Apart from the seriousness of this disease, there is, in the animal industry, a considerable annual loss caused by the condemnation of sheep and cattle livers, resulting from the ingestion of eggs disseminated by infected dogs. It is estimated that at least every second sheep in New Zealand has hydatids. The disease in man, sheep, and cattle is a direct result of the ingestion of viable tapeworm eggs from an infected dog. A healthy dog is infected primarily by the ingestion of hydatid cysts in the offal of farm animals. There are, therefore, two essential issues in the war on hydatids declared by the Department of Hydatids Research and Prevention:

(1) Compulsory dosing of all dogs four times a year with arecoline hydrobromide; and

(2) Prohibition of dogs feeding on raw offal. Every dog untreated, especially the affable dog which children love to stroke, is a human menace, since eggs forming potential hydatid-cysts can be lodged on the hands, and so conveyed to the mouth.

Mastitis

The human milk-borne infections arising from germs entering the udder via the teat duct are septic sore throat, scarlet fever, and **staphylococcus-toxin** food poisoning. Milk-borne septic sore throat is primarily an epidemic disease, and according to the reports of the United States Public Health Service has been for some years the most prevalent milk-borne affection in that country. The commonest cause of mastitis in cows is a **streptococcus** of bovine origin, and occasionally a **streptococcus** is found that has the properties of the dangerous **haemolytic** human type. This is the organism, fortunately uncommon in cows, that is responsible for the outbreaks of septic sore throat. A milker suffering from this disease may, through contaminated hands, be responsible for infecting a milk supply. Scarlet fever may be spread in a similar way.

Public health experience with both diseases reveals clearly that in every outbreak the milk supply should be suspected and a careful examination made to determine whether or not the source might be the udder of an infected cow, or a milker acting as a carrier.

Pasteurisation of milk is a very efficient weapon against milk-borne diseases of the mastitis variety. The responsibility of the farmer lies in the early detection of udder troubles, and in the disposal of affected milk for anything but human consumption as raw milk or milk products.

Direct Treatment

According to recent trials in Australia, the United States, and New Zealand, the udder infusion method, using either entozon 1 in 1,250, or acriflavine, 1 in 10,000 solution, is the most rational and successful direct treatment of mastitis quarters.

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DODDER

Its Life History and Methods of Control

— By —

H. H. ALLAN, Director Botany Division,

Plant Research Bureau, Department of Scientific and Industrial Research, Wellington.

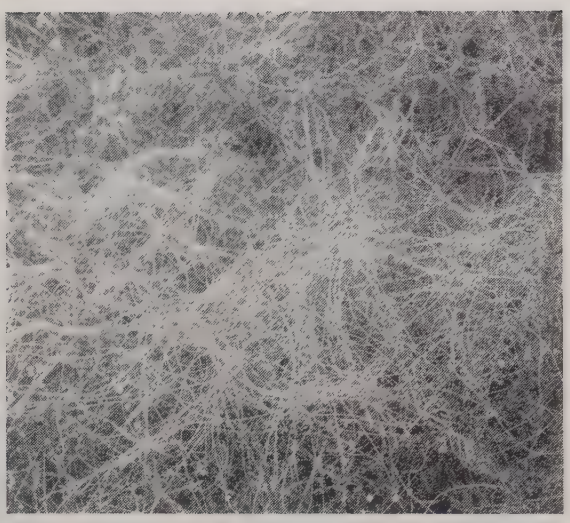

Fig. 1: A typical smother of dodder.

THE dodders (species of *Cuscuta*) are parasitic plants of the convolvulus family, with an almost world-wide distribution, and a great variety of host plants. A number of species infest cultivated plants, and have been spread widely in seed, especially of leguminous plants. About 160 species are recognised, the numbers considered native to the different continents being: North America 48, Mexico and Central America 51, South America 90, Africa 36, Asia 61, Australia 8.

Two species have been recorded as native to New Zealand. In 1854, Hooker described as a new species *C. densiflora*, from specimens collected by Lyall, who had served as surgeon-naturalist during the survey of the coast-line of New Zealand by Captain Stokes, of H.M.S. Acheron, in 1847-1851. Of these specimens, collected at Port Underwood, Hooker wrote: "The only New Zealand species has slender stems, like masses of tangled packthread, and crowded six- to 10-flowered racemes, ¼ to ½ inch long, of small yellow flowers, ⅛ inch long." T. Kirk in 1887 wrote: "Two species of *Cuscuta* are indigenous to New Zealand; one, *C. densiflora*, is rare, being found only in Marlborough and Otago, in both cases growing on *Fuchsia excorticata*. The other, *C. novae-zealandiae*, grows on small herbaceous plants, grasses, fern, and low-growing shrubs. Like its imported congeners, it may become a pest to the farmer, as it occasionally kills small patches of grass by exhaustion." Kirk did not publish any description of this second species, and Cheeseman, who had seen Kirk's material, had "no hesitation in referring this to northern *C. epithymum* Linn., which has been observed in many localities in the Dominion, and which often associates itself with the indigenous vegetation." No further collection of undoubted *C. densiflora* appears to have been made. Yuncker, who published a detailed memoir on *Cuscuta* in 1932, examined a specimen in the herbarium of the Missouri Botanical Garden, part of the original collection of Lyall. He referred it to *C. suaveolens*, retaining it as var. *densiflora*. *C. suaveolens* is native to the southern part of South America, but is now widespread through its association with lucerne. On the var. *densiflora*, Yuncker remarks: "The perianth lobes are blunt and shorter than is normal for *C. suaveolens*, and the corolla lobes are not markedly inflexed. Only one seed was found in the capsules opened. Otherwise it appears to be similar to the typical form." Until further material is available, it must remain uncertain whether there is a *Cuscuta* indigenous to New Zealand or not.

The slender, branching thread-like, leafless stems; the clusters of small bell-shaped flowers, and the sucker attachments to the host plant, make *Cuscuta* easy to recognise (Fig. 1). Northern residents will be familiar with the mawhai *(Cassytha paniculata)*, a similar but unrelated parasite. The rather stout, flexible, yellow-green stems of this form dense entangled masses on shrubs or trees, and the plant appears to be almost indifferent as to what host it fastens on to.

The first record of lesser dodder *(C. epithymum)* in New Zealand appears to be that of G. M. Thomson, who reported it in 1870 on clover in Southland. About the same time, T. Kirk found it in the Waikato district. With the increasing use of clovers this dodder has extended its range considerably, and is much the most important species in New Zealand (Fig. 2). When found on clovers it is often referred to as *C. trifolii*, and as such was placed in the third schedule of the Noxious Weeds Act in 1900.

In 1887, Kirk reported the presence of lucerne dodder, *C. suaveolens (C. hassiaca)*: "This species was first observed on lucerne in the Canterbury district. The seed had been imported from California. In some parts of the field it was most abundant, and had extended its operations to the sorrel, knotgrass, and other weeds which grew sparingly amongst the crop. The following season the lucerne was very weak and thin, and there was very little dodder; subsequently the crop died out. The lucerne dodder has been observed in several localities in the Canterbury district." Of linen-flax dodder, *C. epilinum*, he wrote: "I have been informed that this species was observed in the Canterbury district about three years ago, but have seen no specimens." Lucerne dodder does not appear to have taken any great hold in New Zealand, though the lesser dodder is not infrequent in lucerne crops. There appears to be no further record of linen-flax dodder, nor has it been reported from among the numerous crops of linen-flax grown in New Zealand during the last few years—a tribute probably to the clean seed used for sowings. This dodder may yet appear, as various other weeds particularly associated with linen-flax crops have been observed recently.

In 1909, T. Kirk and A. H. Cockayne stated that the following species then occurred in New Zealand ("also probably some others"): small-seeded or clover dodder, *C. epithymum (C. trifolii)*; large-seeded dodder, *C. pratensis (C. arvensis)*; Chilean dodder, *C. racemosa*. Cheeseman in 1925 listed: *C. suaveolens* (as *C. racemosa* var. *chiliana*, synonym *C. hassiaca*), "Fields in the Canterbury Provincial district, parasite on lucerne, knotgrass, etc."; *C. epilinum*, "Has been recorded from the Canterbury district, but I have seen no specimens"; *C. epithymum*, "Abundant in

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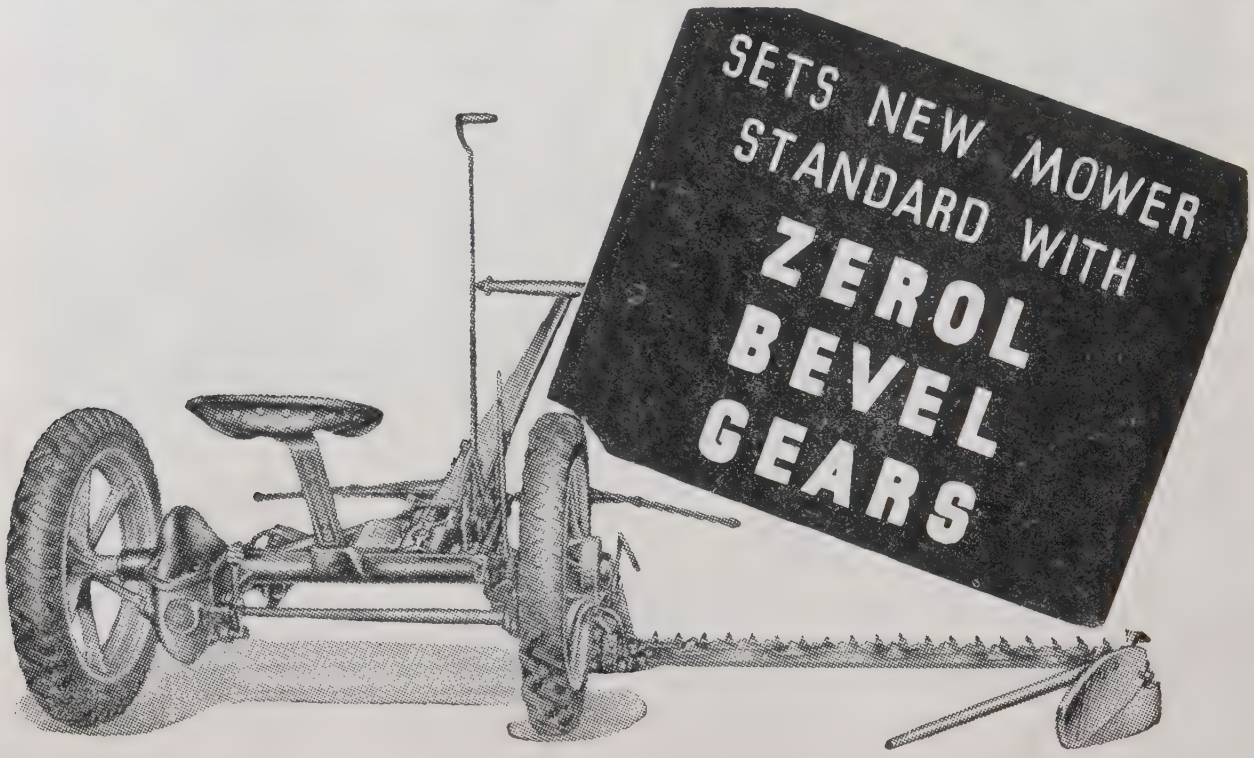

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many places." In 1926 Hilgendorf reported lucerne dodder (*C. racemosa*) as occurring in Hawkes Bay and Canterbury.

In the herbarium of the Botany Division, Plant Research Bureau, in addition to *C. epithymum* on various hosts, there is a specimen of *C. pratensis* recently collected on beet at Ohau, and two dilapidated specimens apparently of *C. racemosa* on knotgrass *(Polyganum aviculare)*, collected by Kirk. There has as yet been made no thorough examination of the dodders occurring in New Zealand, and the material available to me is not as yet sufficient for a full study. In the meantime, the following descriptions may be of use to those interested in the question.

Descriptions of Species

1. Lesser or Clover Dodder: C. epithymum Murray. Fig. 2. *Stems* slender, yellowish brown to purplish, much branched. *Flowers* about 1½ lines[1] long, unstalked or nearly so, in dense clusters. *Calyx* about half-length of corolla tube, lobes acutely pointed. *Corolla* white, with acute lobes. *Stigmas* elongated. *Capsule* sub-globose, usually with four seeds. *Seeds* about ½ line long.

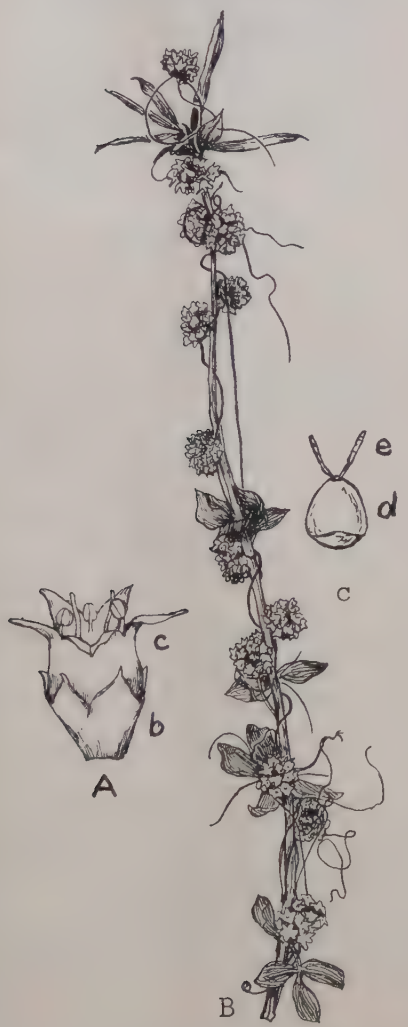

Fig. 2.—Lesser or clover dodder. *A*, flower; *b*, calyx; *c*, corolla. *B*, dodder threads and flower-clusters on birdsfoot trefoil. *C*, fruit; *d*, capsule; *e*, stigma.

2. Lucerne dodder: C. racemosa Martius. Fig. 3B. *Stems* slender, yellowish, branched. *Flowers* about 1½ lines long, distinctly stalked, in loose clusters. *Calyx* about third length of corolla tube, lobes rounded. *Corolla* yellowish, with bluntly pointed to acutish lobes. *Stigmas* globose. *Capsule* subglobose, with 1 to 4 seeds. *Seeds* about 1 line long.

3. Scented dodder: C. suaveolens Seringe. Fig. 3C. *Stems* slender to rather stout. *Flowers* 1½ to 2 lines long, more or less glandular, shortly stalked, in rather loose clusters. *Calyx* about third-length of corolla tube, lobes triangular, somewhat acutely pointed. *Corolla* yellowish, with usually incurved, acute lobes. *Stigmas* globose. *Capsules* globose, with from 2 to 4 seeds. Seeds ½ to 1 line long.

4. Field dodder: C. campestris Yuncker (*C. arvensis* of various authors). Fig. 3A. *Stems* somewhat stout. *Flowers* 1 to 1½ lines long, shortly stalked, in compact globose clusters. *Calyx* almost equalling corolla tube, lobes rounded. *Corolla* yellowish, with spreading acute lobes. *Stigmas* globose. *Capsule* globose. *Seeds* about ¾ line long, flattened on one side.

5. Flax dodder: C. epilinum Weihe. Fig. 3D. *Stems* slender to rather stout or succulent. *Flowers* 2 lines long, unstalked, in compact clusters. *Calyx* almost equalling corolla-tube, with broadly triangular, acute lobes. *Corolla* yellowish, with more or less erect, triangular, acute lobes. *Stigmas* elongated. *Capsules* depressed-globose. *Seeds* angular, about ½ line long.

Lesser Dodder

The seed is ashy grey, dark-spotted, and with a roughish surface, about 0.8 by 0.7 mm., and looks very much like a small speck of dirt. Wrapped round the food supply in the seed is a thread-like coiled embryo with a thickened radicle end. If the seed is placed in boiling water for a short time, and then squeezed, the coiled embryo, peculiar to the dodders, can easily be pressed out. Some 2,500 seeds are produced by a normal-sized plant.

Germination usually occurs in late spring, and in a freshly-sown crop usually later than the host plants. The germination period is fairly long,

[1] One line equals one-twelfth inch.

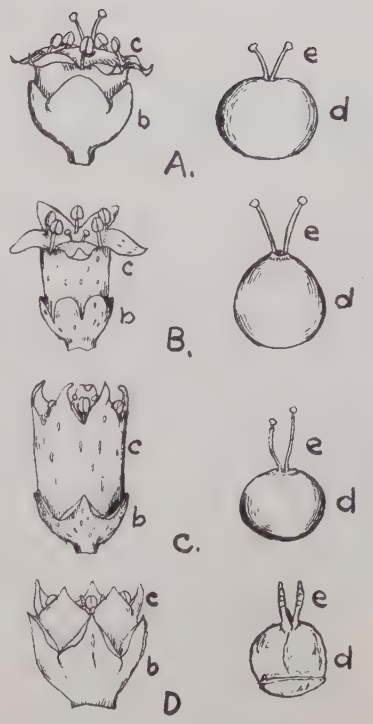

Fig. 3.—Flowers and capsules (after Yuncker) of—*A*, field dodder; *B*, lucerne dodder; *C*, scented dodder; *D*, flax dodder.
(*b, c, d, e*—as in Fig. 2.)

though most of the seed germinates in from five to ten days, especially in a damp season. Some seeds are "hard" and remain in the soil, ungerminated, but viable for several years. On germinating the thread-like coiled embryo unwinds, the thickened radicle end burrows in the soil and produces the ephemeral root-system. The aerial threadlike portion performs a slow rotatory movement. Should no host plant be near enough for contact, the dodder plant dies; but on touching a suitable host, the thread twines round the stem, the basal end dries off and suckers develop, attaching the thread to the host. From the suckers filaments enter the tissues of the host and abstract therefrom the nourishment necessary for growth. The dodder branches freely, and may ultimately cover extensive patches of the host plants, weakening and perhaps finally destroying them.

The host plants so far noted in New Zealand are: *(a)* legumes—red clover, alsike clover, white clover, crimson clover, suckling clover, hop trefoil, lucerne, broom, gorse, birdsfoot trefoil; *(b)* other useful species—potatoes, carrots, thyme (rare on these); *(c)* weeds—dandelion, fleabane, oxeye daisy, rib-grass, cleavers; *(d)* native plants—bracken *(Pteredium esculentum)*, pohue *(Muehlenbeckia complexa, M. axillaris)*, manuka *(Leptospermum scoparium)*. Of outstanding importance are the clovers.

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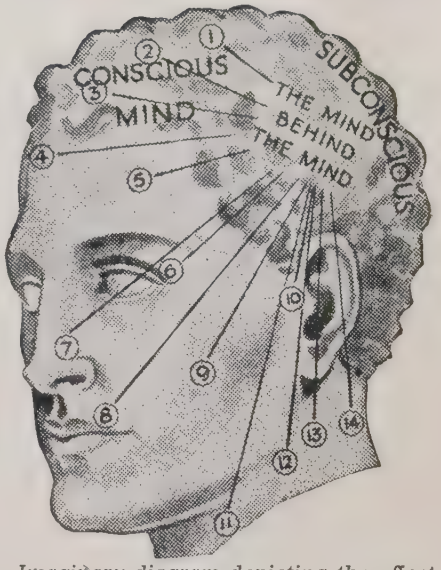

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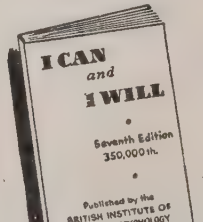

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In summer small, dense clusters of white or slightly pink-tinged, sweet-smelling flowers are produced. Each flower produces four seeds, which fall when ripe, while the parent plant dies. The fact that dodder is an annual has an important bearing on control measures.

Control Measures

1. No dodder-infected seed should be sown. Owing to the smallness of dodder seeds, it is easy to remove most of the species, including lesser dodder, by sieving.

2. As dodder is an annual, control measures should be applied well before the plant begins to form flower clusters.

3. Any treatment that will spread fragments of the stems should be avoided, as such fragments remain alive for several days, and readily attach themselves to new host plants. A "NOT" appears to have fallen out of a sentence in Hilgendorf's "Weeds of New Zealand," page 139, in which it is said: "The cuttings should be carted away and fed to stock in case any ripening seed should fall on the ground." Such feeding to stock is safe only while there is no sign of flower development, and even then there is the risk of spreading fragments to new areas. It is to be noted also that dodder seed passes unharmed through the animal body.

4. Most authorities agree on the following advice: Mow infested patches well beyond the apparent area of infection, heap the mown material, cover with chaff or other inflammable matter, and burn the heap thoroughly. Kerosene or other aids to a hot fire are advocated.

5. Another method frequently advised is: Dig a trench round the infested patch and heap the soil over it. It is claimed that the dodder will not long survive burial. Continental authorities recommend a good covering of farmyard manure, as this is said to destroy seeds as well as plants.

6. In large infestations, where the crop has suffered severely, ploughing under is recommended, followed by a cultivated crop. Where any seeding of the dodder has taken place it is recommended that clovers be not again sown for at least five years, to ensure that all seed has germinated and died.

7. Success has been reported with several sprays: *(a)* sheep dip, whether fresh or after use; *(b)* sulphate of iron in a 15 per cent. solution; *(c)* arsenite of soda, 1 lb. to 10 gallons of water; *(d)* sulphuric acid in a 3 per cent. solution.

No doubt, sodium chlorate would also be effective. Experimenters state that with the above treatments the clover or lucerne is badly blackened and set back, but recovers, while the dodder is completely killed.

8. Good results are said to have been obtained from a dressing of 8 cwt. sodium nitrate per acre.

9. Especially in lucerne crops, but also in clover, early cutting for hay has been advocated, to prevent seeding. The danger of spread by stray fragments of the cuttings has to be remembered. Grazing rather than cutting for hay has also been recommended. Again, it is necessary to remember that dodder seed is not harmed by passage through stock. All these methods aim at utilizing the crop before flowering has commenced and by preventing flowering by further cutting.

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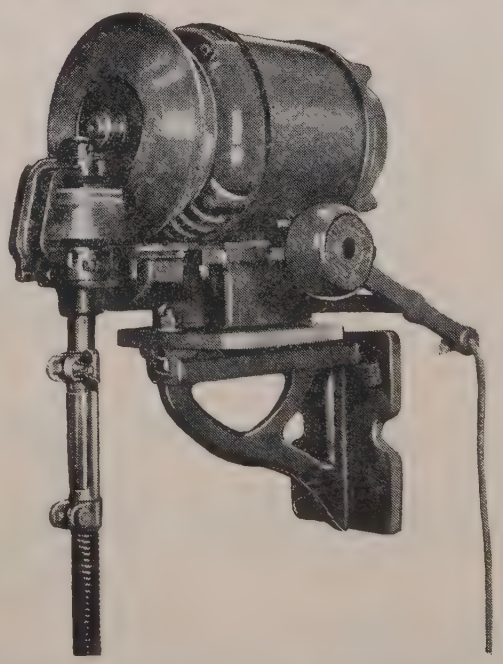

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Veterinary Notes for the Farmer

Guard Against Blow-fly Strike in Sheep

Contributed by the Livestock Division.

BLOWFLY strike periodically becomes an acute problem to the sheepfarmer, particularly on the higher country. At the present time sheepfarmers in Hawkes Bay, Marlborough, and especially in the Wairarapa districts should periodically examine the lambs to detect recently struck animals. The recent rains will have stimulated a growth of feed, and the general tendency will be towards a looseness of the bowels, if not actual scouring. Any staining of the wool of the crutch, whether from urine or scour, is liable to be struck when the flies are active. Urine staining of the wool and skin, together with the break-down products on the surface of the skin, attracts the egg-laying fly. In muggy weather the warmth and moisture necessary for the hatching of the eggs and the growth and development of the maggots are most suitable, so that the strike of individual animals soon becomes apparent.

Investigation has shown that sheep of the Merino and half-bred flocks because of the wrinkling and folds of the skin, are more liable to staining and more susceptible to strike, and that the plain-bodied sheep are less susceptible. However, when it is considered that a single fly may lay 1000 to 1200 eggs, and that several generations may develop in one summer, it will be seen how important it is for all owners of sheep, irrespective of breed, to adopt all measures possible to prevent susceptible animals from becoming "blown" or "struck."

In New Zealand the flies responsible for strike are the yellow-brown, hairy species and, less commonly, the bronze-green species. The blue bottles and the striped field flies do not blow living sheep, but confine their activities to dead animals. On the other hand, the striking flies may propagate readily on dead carcases in the absence of suitable live animals. This brings out the fundamental importance of the deep burial or burning of all such carcases. It would appear more important to prevent the breeding of the fly than to set traps or adopt other methods of destruction if breeding remains uncontrolled. As it is not possible to find every carcase for burial or burning, especially when dead rabbits, hares, birds, etc., provide suitable breeding grounds, some other methods of attack aiming at prevention have been given consideration and trial.

Prevention

Probably the most important line of prevention is the elimination of the conditions in our sheep which attract the egg-laying fly. To prevent strike on the breech an early crutching of all lambs in late December or early January is necessary, followed by a further re-crutching, dependent upon the weather and feed conditions. Extreme care should be taken not to cause skin injuries during crutching, as even small wounds will attract the fly.

Jetting with calcium arsenate solution has been found a useful preventive in Australia, but crutching is the more suitable procedure in this country. Jetting cannot be combined with crutching, as the possibility of the arsenic being absorbed through crutch wounds is too well known. Jetting is carried out in Australia after all wounds have healed, and is considered more economical than a second crutching.

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My neighbour's firm recommend renewing inflations every month, and we both use same type, but mine are as new after 2 months. The N.D. is remarkably easy on the cows and has my recommendation as a very clean milker.

Yours faithfully
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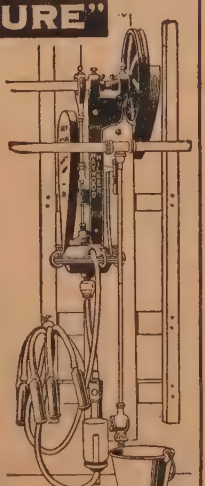

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Suttons costs from 1/5 per 100 young lambs to 5/10 per 100 fully-grown sheep.

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All wounds in sheep, including foot-rot, should be dressed and treated in the usual way to prevent their being "blown" by the fly.

The affected lamb or hogget will be found dejected, away by itself, probably along the fence line or under cover of a tree. A blackish, moist area may be seen on the rump from a distance, but it is necessary to catch and examine all suspected animals at close quarters.

Treatment

Treatment (of the lamb) consists of clipping off the wool around the area where the maggots are operating. It is necessary to see that all maggots are killed and removed, otherwise a few may have escaped, to operate in and form a second wound. Boric acid and glycerine, prepared by heating 3 lb. of boric acid in one gallon of pure glycerine, forms a very good, although rather expensive, dressing for fly wounds. It kills the maggots, assists healing of the wound, and tends to prevent a second strike until complete healing has taken place. Cheaper dressings which are effective for destroying the maggots are:—(1) A 5 per cent. solution of zinc sulphate in water, or (2) a 4 per cent. mixture of carbolic crystals in whale oil. Boric acid powder alone may be dusted on. A 2 per cent. solution of liquid carbolic sheep dip or similar disinfectant is effective in driving out maggots, but it is wise to follow up with an oily application, using lubricating or whale oil. Kerosene or bluestone should not be used.

Finally, it may be mentioned that certain paddocks appear to favour the operation of the fly. A change of paddock and moving the sheep into the open, level paddocks and away from cover or steep faces are worth consideration.

Pig Industry Broadcasts

UNDER the auspices of the District Pig Councils concerned, broadcasts will be delivered in February as follows:—

1YA, Auckland—February 17, 7.15 p.m., "Maintenance of Lay-out," by H. H. Preston, Supervisor, Northland District Pig Council.

2YH, Napier—February 10, 7.30 p.m., "Housing and Sanitation," by I. H. Owtram, Supervisor, Tairawhiti District Pig Council.

2ZA, Palmerston North—February 15, 8.30 p.m., "Autumn Feeding," by L. Marsdon, Supervisor, Wellington District Pig Council.

4YA, Dunedin—February 14, 7.15 p.m., "Whey Feeding," by Mr. Roderique, Supervisor, Otago District Pig Council.

Answers to Correspondents

Warts On Cows' Teats

"J.W.W." (Stratford):

I would be glad if you could tell me how to get rid of warts on cows' teats. Last season I had a cow with a number of hard, seedy warts, and this season a number of cows have come in with their teats one mass of warts, and it makes them difficult to milk. The trouble appears to be contagious, and therefore I would be glad of advice regarding treatment. Also, can you advise a cure for cow pox?

LIVESTOCK DIVISION:—

Warts on cows' teats: As you suspect, this condition is infectious, and may be spread from cow to cow. The spread will be favoured if the warts are bruised or broken during milking, and the next cow milked has cracks or sores on the teats into which the virus may be inoculated. To prevent spread, milk any affected cows last. If hand milking is practised, milk with full hand, avoid stripping teat down between finger and thumb, wash hands thoroughly before handling udder of a fresh cow. The machine cups will probably injure the teat less with this condition than hand milking; cups should be dipped in hot water and allowed to cool before putting on a fresh cow.

Treatment is not always very satisfactory, but an ointment with 1 part of salicylic acid to 8 parts of lard or animal fat is the most suitable. Apply after milking, wash off before applying teat cups.

Advisory Service on Veterinary Matters.

Farmers are invited to submit inquiries connected with the health of their stock, and the replies will be published under this heading.

Cow Pox: Cow pox is normally a mild highly infectious condition in which small "blebs" or blisters occur on skin of teats. It is readily spread by the milker's hands or the machines, hence the hands should be washed or cups sterilised after each affected cow. Where an outbreak occurs it is advisable to use a small amount of a chlorine disinfectant in water for washing udders, and not to use a common washing cloth. A simple ointment of zinc oxide, or boric acid, is a suitable dressing. Milking should be as gentle as possible to avoid damage to the teats, and here again the machine probably causes less injury than stripping by hand.

"Black Pox" is a name given to a virulent type of skin affection of the teat. It is due to infection of any small crack or scratch by a common germ, the bacillus necrophorus, and may follow an attack of cow pox. The tissue around the injury becomes swollen, hard and tender, there is an adherent black scab, under which the inflammation tends to go even deeper. If the point of teat is affected it may be advisable to discontinue milking the quarter, otherwise mastitis may be set up. The salicylic ointment as above may be used; where point of teat is involved it may be soaked in a little warm hydrogen peroxide solution diluted 1 to 3 in a cup.

Cow With Footrot.

"J.A.B." (Taupiri):—

Four or five months ago I had a cow with footrot, and since then I have had about ten with the same trouble. At the present time I have four with footrot. What remedy is recommended?

LIVESTOCK DIVISION:—

Footrot in cows sometimes assumes a seemingly contagious form; affecting

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a considerable proportion of the herd. The causal organisms or germs may be found anywhere, but in such outbreaks the possibility of some common predisposing factor or factors must be looked for, such as fresh metal, gravel or fascines in gateways or around the shed, or anything that may cause injury between the claws, thus affording entry to these germs.

Affected feet should be cleaned and examined as soon as noticed, at which stage the application of a caustic solution between the claws followed by a coating of tar is often sufficient to prevent further development of the infection. A strong solution of bluestone is commonly used.

In old standing cases a core of dead tissues may have developed between the claws, the removal of which is essential, to be followed by such treatment as bluestone footbaths.

Should the claw joints have become infected the outlook is not good.

Protection of affected feet and the avoidance of mud as far as possible are desirable and, of course, the removal of any predisposing causes that may exist such as the abovementioned.

Infected Pastures

"P.L.H." (Levin):—

"How long would you recommend a property that has been occupied by a dealer in cull dairy stock to be farmed with, say, sheep in order to clear up any infestation of the pastures before returning to dairy-farming? I surmise that if heifers were reared, they would be just as susceptible to disease as milking cows. I realise that much would depend on the climate and extent of infestation with the many cattle troubles which we have today, but I would appreciate your opinion on the above questions under average conditions."

LIVESTOCK DIVISION:—

The infectious agents most likely to be left on pastures and picked up by fresh dairy stock are the organisms causing tuberculosis, Johnes Disease, contagious abortion, Actinobacillosis (or wooden tongue), certain types of Mastitis, and the larval forms of certain worm parasites. It is possible that organisms causing blackleg might be carried by young cattle from a blackleg area. This is unlikely in your case.

As you state, much depends on soil and climatic conditions, also the amount of cover on the soil. In an area such as Levin, where the number of hours of sunlight is reasonably good, and the subsoil, for the most part, drains well, and where sheep were used to keep the pasture well trimmed down, such infections would die out more quickly.

Tubercle bacilli may remain infective for up to 5 months in animal droppings. There is no definite evidence as to how long Johnes bacilli would remain infective. They are a similar type to the tubercle bacilli, but it has been suspected that infected pastures might remain dangerous for as long as two years. We have no record of Johnes Disease in the Levin or Manawatu areas; you could probably disregard this disease.

Bangs bacillus causing contagious abortion should be destroyed within a matter of three or four months. However, you are just as likely to reintroduce this disease by carrier cows, and it would be advisable to start off with clean, empty heifers on the place.

Mastitis organisms of the usual type might just possibly be contracted from infection on the pastures, but this dies out comparatively soon, and in any case nearly all the infection is contracted at the shed and during milking operations.

Parasitic infections would not be likely to be distributed by mature cows, but by young stock up to the yearling stage. They might require at least twelve months before they died out on pastures. They would likewise only be dangerous to young stock coming on the place.

On the whole, therefore, one could say that a period of 12 months' complete rest from cattle, with grazing by sheep in the interval, should be sufficient to rid the place of any infection likely to be picked up by dairy stock in that area. A longer period would of course be better still, if convenient.

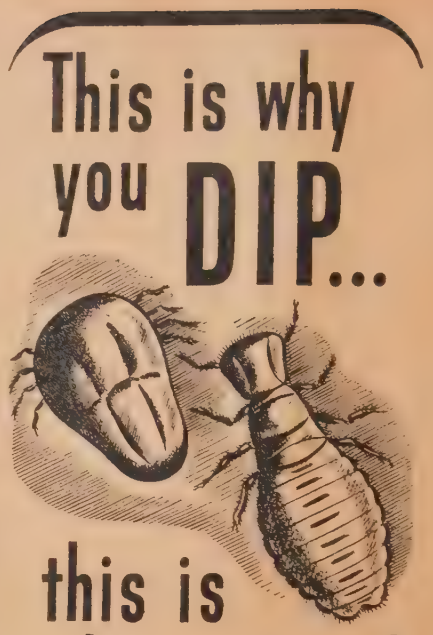
Pig With Prolapsed Bowel

"R.A.H." (Koiterangi):—

"I have a pig (porker about 70 lb.) whose bowel is protruding about 2½ inches (two weeks). I locked him up as soon as I noticed the condition, and have been feeding him on a little skim milk only. Apart from the prolapse, there is nothing wrong with him, and he is in good condition. I am bathing the part with boracic lotion twice a day, and occasionally apply a little lubricant (paraffin or castor oil). The prolapse gives the appearance of going septic, although this has not occurred yet."

LIVESTOCK DIVISION:—

Your pig is suffering from prolapse of the anus and probably some portion of the bowel. The original cause of the trouble is straining, which may be brought on by several causes—constipation, diarrhoea, increased abdominal pressure, possibly due to overfeeding with certain types of food, or anything causing inflammation of the rectum. In the case of your pig, it may be necessary to cut away portion of the protruding bowel, or draw a line round it with a small brush dipped in strong carbolic acid to enable the part to slough off. For a week or so the diet should be the



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smallest quantity of the most nutritious food, such as whole maize or other corn, which will allow the abdomen to shrink and so lessen the previous pressure on the bowel. If the membrane has become septic, the affected part should be scraped before the bowel is returned.

The hindquarters are raised, clean the swollen part and lubricate it with vaseline, and then gradually manipulate the part back to its original position. Complete reduction is necessary, otherwise the prolapse will recur. Finally, a purse-string stitch through the skin round the anus will be beneficial.

Dog With Worms

"C.A.McA." (Ashburton):—

"A cattle dog, recently purchased, went off condition rapidly, and being given two arecoline tablets passed a rope of tape worms about 18 in. long. His coat is still hard and dry and he is not putting on condition as he should. What should be done about it? The tablets were just pushed into a small lump of fat which the dog swallowed whole. The method of dosing has been stressed because some dogs become very hard to administer the dissolved tablets to. The last one I had needed a crude muzzle before he would allow anyone to take hold of him after he had been dosed a couple of times."

LIVESTOCK DIVISION:—

Your cattle dog requires to be dosed regularly with arecoline tablets, especially as you have discovered an easy method. After dosing, add five grains of carbonate of iron, with twenty grains of Epsom salts, to the daily feed for a week or ten days. This will act as a tonic and improve the coat.

Cows With Mastitis

"D.G.B." (Feilding):—

"I have four cows, good producers, and although their quarters are not hard or inflamed, the first milk drawn from them, apparently the milk in the duct, is cloudy, and if not massaged they go watery, similar to whey. Three of these cows have only one quarter affected, the other has two. I have been massaging them for about a month with udder lotion (Ring's). In my opinion, they need a drench, and as I milk 73 cows I do not wish the complaint to spread, although we keep the machines off the affected cows. Would this be a form of mastitis, and is it serious? If a drench would be of benefit, could you tell me of it?"

LIVESTOCK DIVISION:—

This is undoubtedly a type of mastitis, and you are wise to treat it as infectious and to keep these cows to the last of the herd. Drenching at this stage is not likely to have very much effect, but you could try 1 ounce bicarbonate of soda and 8 ounces Epsom salts dissolved in a quart of lukewarm water. It is also a help to keep affected cows on a bare paddock, allowing a little hay, for a few days. In some such cases the use of the quarter may be lost for the season, but may be mostly regained next year. The most effective treatment is by an injection of a suitable antiseptic into the quarter, but you would require a veterinary surgeon to carry this out.

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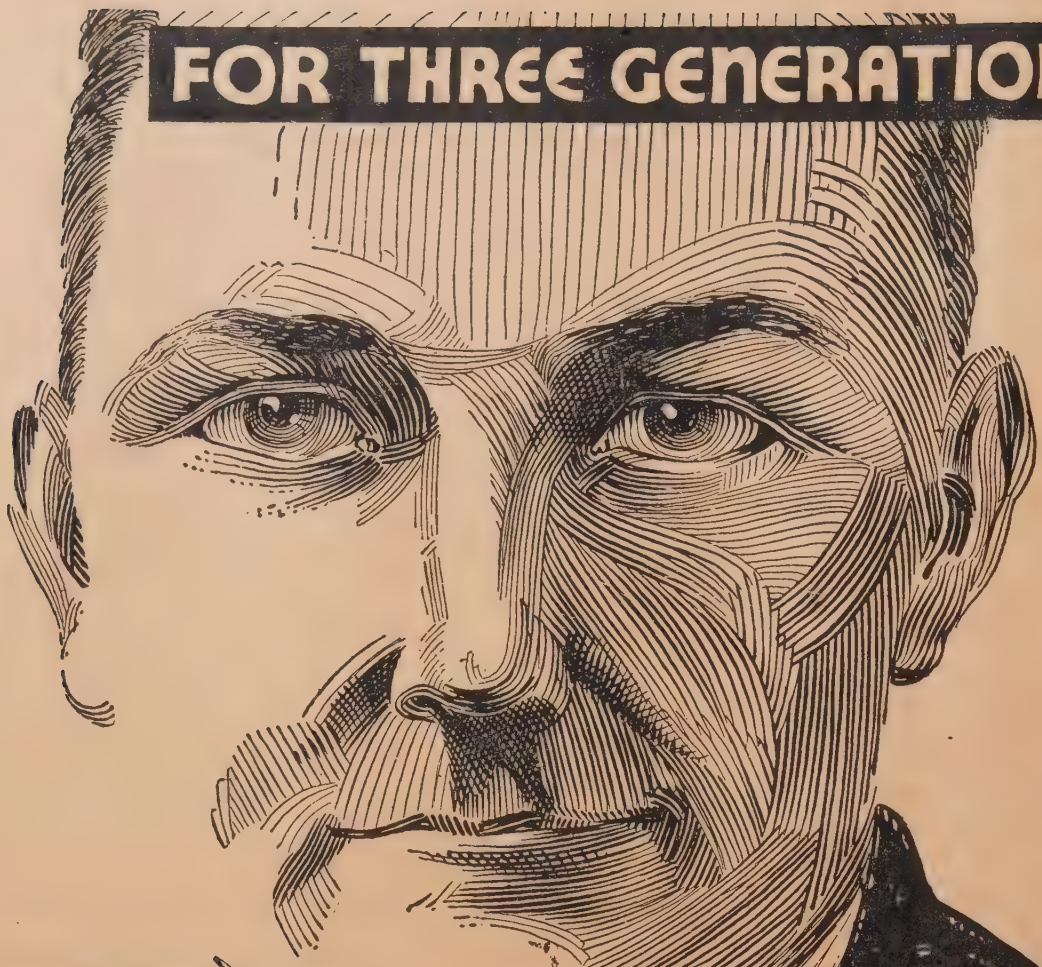

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Orchard Notes

Current Work in the Orchard

DURING the coming months the following seasonal operations will be necessary:—

Spraying for various pests and diseases;

Attending to the sowing of a cover crop;

Harvesting and packing the fruit crop; and

Budding of fruit trees.

Spraying, as recommended in the previous Journal notes, should be continued for the control of glomorella, codling moth, leaf-roller caterpillar, red mite and leaf hopper on pome fruits, and brown rot in stone fruits.

Prior to the commencement of grading and packing operations, the sizing machine should be thoroughly cleaned and tested; it is important that the machine should be free from dirt, sharp edges, and surfaces which might injure the fruit. Shed conditions should be perfectly hygienic. No reject, rotting, or diseased fruit should be allowed to remain in, or near, the packing shed, otherwise fungal rotting in the packed fruit is likely to be encouraged, thus greatly depreciating the value of the consignment.

Harvesting the Crop

In making the first picking of fruit for the season, care must be taken not to remove from the trees immature, under-sized fruit, or fruit not carrying the necessary colour requirements. This can be avoided only by very careful picking by experienced pickers. They should be familiar with the essentials that must be observed when picking fruit for the market, such as colour requirements, maturity, size, and freedom from disease. The most reliable guide when deciding if the fruit is sufficiently mature for picking is the distinct change from green to light yellow of the ground colour, plus the ease with which the fruit parts from the tree.

Inexperienced pickers should be carefully supervised until they become accustomed to the work. Fruits of either apples or pears do not all mature at the same time, and serious loss may be incurred by immature fruit being picked. The fruit at the top and on the sunny side of the tree matures first. It is necessary to make at least two pickings. The larger, more mature, and best-coloured fruits should be harvested at first picking, leaving the balance to improve in size, maturity, and colour.

Careful Picking

The fruit should be picked by giving it a sharp turn upwards, when, if sufficiently mature for picking, it should break clean away from the spur with the stem intact. Considerable loss may result if the fruit is carelessly and roughly removed from the tree; not only is the stem pulled from the fruit in this manner, but fruit spurs provided by Nature for future crops are broken off.

Growers, in their own interests, should make every endeavour to eliminate as nearly as possible the large percentage of bruised or otherwise damaged fruit that is usually to be found in almost every packing shed. This injury is often caused by rough, careless, and thoughtless workers, either in the orchard or packing shed, or both, and can no doubt be reduced to a minimum if reasonable care is taken during harvesting and packing. In fact, rough or careless handling of fruit of any description should not be tolerated in any packing shed or orchard. Common causes of damage are:—

(1) Overfilling of picking bags and orchard cases,

(2) Dropping fruit into picking bags instead of placing them in carefully,

(3) Roughly emptying bags into the packing boxes,

(4) Overloading of the grading-table, conveyor rollers, and belts, and

(5) Overloading the packing bins, resulting in restricted space, causing stem punctures, scratches, and abrasions.

Budding

The budding of fruit trees may be proceeded with, for, although the

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season for budding extends until the end of March, the success attained depends so much upon the state of stock at the time of budding that careful watching is necessary to perform the operation while the stock is in the most satisfactory condition for working. To bud successfully, the operation must be performed while the sap is active and the bark is easily raised for insertion of the buds.

Before commencing to bud, select thrifty, well-ripened buds of this season's growth. Over luxuriant shoots should be rejected as likely to form trees deficient in fruitfulness. Care should be taken to select buds from trees that are perfect in character. Imperfect, immature, or fruit buds must be rejected, leaving only single wood buds for use. It is advisable to keep the buds on the shoots until they are required for use, and if prepared previously they must be kept moist, or otherwise they will dry up quickly and become useless.

Cutting the Buds

The chief art is in cutting the buds. This must be done with a very sharp knife, cutting a thin, smooth slice of wood and bark containing the bud. Inserting the bud is a very easy matter. Make an upright incision in the bark of the stock about an inch in length, and at the tip make a clean crosscut, forming the shape of a T, then carefully raise the bark and insert the bud, and immediately tie with raffia or other suitable material. The tie should receive attention a few weeks after budding, and if the trees are becoming strained by the swelling of the stock, the ties should be cut through the back or loosened, but do not remove them at this stage.

—A. T. DOUGLAS,
Acting District Supervisor,
Horticulture Division, Auckland.

Citrus Notes

Spraying Time is Here

FROM January until the end of April is spraying time for control of scale insects. A January spray is unnecessary, except where more than one application is required to combat severe infestation of the trees with red scales, or with any of the soft scales. These insects continue to produce young until about the end of March. If only small numbers are present, it is better to apply a control spray of summer oil towards the end of the breeding season, when the maximum kill will be obtained, and the carry-over reduced to a minimum. White wax scale, which requires somewhat different treatment, is discussed in detail below.

Leafroller may continue to be troublesome during January and February, and to require a further arsenate of lead spray. If thrips are active, an application of nicotine sulphate will be necessary.

Cultivation

Light cultivation should be continued, both for conservation of soil moisture and to keep the land reasonably free of weeds preparatory to the sowing of cover crops in autumn. Supplies of seed and fertiliser should be ready about March. A leguminous cover crop, such as blue lupin, is recommended on account of its capacity for collecting nitrogen. Non-leguminous crops are useful for providing a good bulk of material for turning-in on land which may have been cropped for a long period with lupins.

White Wax Scale

This scale **(Ceropiastes sinensis)** has a number of common names, including hard wax scale, Indian wax scale, and Chinese wax scale. The insects are also referred to as "barnacles," due to their appearance and their habit, in the adult stage, of congregating in thickly crusted groups on small twigs.

White wax scale differs from others attacking citrus trees. A variation from the ordinary scale-spray timing is necessary because these scales continue to hatch in large numbers until about the end of April, which is later than the most active period for red scale. The appearance of the white wax scale changes very much between crawler and adult stages, giving rise to the belief, by those unfamiliar with the pest, that they are two distinct species.

There is only one brood each year, but hatching of individual young may occur at any time during an extended period. Small numbers of crawlers may be expected in December, but usually there will not be great numbers until January or later. Newly-born crawlers continue to arrive until about the end of April, after which only small numbers are likely to be produced.

How They Develop

The young insects are small, pure white, star-like scales which make their way to the leaves, where they attach themselves to the central and lateral veins, frequently in attractive-looking patterns. They are most numerous on upper-leaf surfaces, where they may suddenly show up in hundreds, but they can also be found on under-leaf surfaces. They rarely, if ever, attach themselves to fruits. As winter approaches and the scales grow to about half size, they commence to migrate to twigs and smaller green branches, where they settle permanently in dense colonies which have suggested the name "barnacles." By the time they arrive on the twigs, they will have developed their hard, waxy shells.

In their new situations the scales mature, losing their snowy whiteness and becoming greyish with dark spots, growing roughly hemispherical in shape, and reaching a diameter up to about a fifth of an inch by early summer. They will then be full of developing eggs and quite firmly attached to the twigs. A little later nothing is left but a crusty shell, full of light-coloured pinkish eggs, which can be shaken out like fine powder. Under a fairly strong glass, it is often possible to see a number of tiny crawlers among the unhatched eggs. When the young are hatched the old scales drop to the ground.

White wax scales in moderate numbers are not very severe on tree vitality, but they are among the scales which cause sooty mould.

Control

Because the main breeding season of white wax scales continues until towards the end of April, it is necessary to spray late to obtain a satisfactory control by preventing carry-over. Spraying too late in the season gives poor results, because the scales become partially resistant soon after they migrate to the twigs and small branches. Therefore, the best time to spray is about the last week in April, or two sprays about mid-April and early May, while the majority are still on the leaves, at which stage they are easily destroyed. Sprays should be applied thoroughly to cover leaves and green wood—one application at 3-100, or two sprays at 2-100, of summer spraying oil. Earlier sprays, aimed at control of red scale, do not deal effectively with the white wax scale.

—I. L. NOTTAGE, Orchard Instructor, Tauranga.

Guide for the Home Garden

Protection Against Garden Pests

"The kiss of the sun for Pardon,
The song of the birds for Mirth,
One is nearer to God in a Garden,
Than anywhere else on Earth."

Motto

UNDER existing conditions the necessity for economic self-sufficiency being extended, as far as practicable, to the home-life of the community, should require no further advocacy than that of necessity for the maintenance of the health of the people, individually and collectively.

That the physical welfare of the whole of the people is intimately associated with the consumption of fresh vegetables is generally recognised; but there still remains the problem of how the home gardener may utilise to best advantage his usually limited garden area for vegetable production.

In a recent cabled message from Great Britain, the world-recognised authority on human nutrition, Sir John Boyd Orr, is reported to have stated at a conference of scientists in London: "The establishment of national nutritional standards will become an ultimate necessity." Amplifying this statement, Sir John intimated that vegetable consumption would assume a much more important role in the nation's dietary requirements.

The possibility of autumn and winter-maturing green vegetables being in short supply with a recurrence of unsatisfactory prices to the consumer is widely recognised. The incentive, therefore, to Dig for Victory, even if it were a selfish one, may be very real, necessitating every effort to produce maximum supplies from one's own garden.

"There is 'something' in freshness and quality of food which is not accounted for by its known chemical ingredients."—Sir Robert McCarrison.

Control of Pests

Although not a great seed-sowing month, February should nevertheless be a busy month—at any rate the pests are busy. It is towards the middle or latter end of the month that the caterpillars of the white butterfly increase in number, and, consequently, the work of destruction carried out by them is sometimes disastrous, particularly among all varieties of the cabbage family. On small gardens hand-picking of these pests can be done with considerable success, and this means of protecting the plants should not be neglected. In searching for them, the underside of the leaves should be closely examined, especially those which roll backwards. It is in this sheltered part of the plant that the caterpillars may be found resting, prior to getting out to start feeding.

The caterpillar of the diamond-back moth is a pest which attacks and, if not dealt with, will also play havoc among the crops referred to above. Hand-picking of this pest, however, is more difficult, because it is very much smaller. The larvae is most active at night time, but shelters under the leaves during the day, and owing to this known habit a daily investigation is worth while. As both these caterpillars are of the chewing species, the most effective means of control is by the use of arsenate of lead.

As autumn and winter-maturing cabbages, cauliflowers, etc., will be in their most active period of growth they should be sprayed at least every 10-14 days with a mixture made by adding 1 oz. of arsenate of lead to 2½ gallons of water. The arsenate, in powder form, should be first mixed with a small quantity of the water being used. When spraying, the underside of the leaves and the hearts of the vegetables being treated should receive special attention. Once the caterpillars enter the heart of a cabbage, the natural folding in of the first wrapper leaves makes it impossible for the poison to get where it will be eaten by the pest.

Aphides

The method of attack by these pests is quite distinct from that of the caterpillars. Whereas the caterpillar is known as a chewing insect, aphis pierce the leaf with their mouth-parts and suck the sap from the plant, and therefore are known as sucking insects. On all plants of the cabbage family they are easily recognised, as their main habitat is on the underside of the leaves where they may be found in large numbers, particularly during periods of warm, dry weather. They are easily destroyed either with nicotine sulphate, derris dust, or Paranaph. When plants are affected by both caterpillar and aphis, a spray combining arsenate of lead with nicotine sulphate may be used against both pests. When nicotine sulphate is used as a spray it is best applied during the hottest part of the day. Arsenate of lead alone is ineffective against aphides.

Tomato Stem Borer

The eggs of this pest are usually laid on the foliage, but the insect finds its way into the stem, invariably just above soil level, and by tunnelling upward ultimately causes the death of the plant. The inclusion of arsenate of lead in the Bordeaux mixture will give a large measure of protection. It should, however, be applied early, not after the pest has attacked the plant. Destruction of old tomato plants by burning and crop rotation are the best means of preventing the accumulation of this insect in the soil.

Tomato Plants

Plants which were set out towards the latter end of October should now be well forward and rapidly climbing the stakes. Spraying with Bordeaux mixture, with which has been mixed the proper quantity of arsenate of lead as an insecticide, must not be neglected if the full crop, free from blight and preventable diseases, is to be harvested. If pushed for time, try to anticipate rain and spray before it occurs. To spray after blight has attacked the plants is useless, as it is estimated that a plant is affected at least ten days before the disease becomes externally apparent.

Plants affected with spotted wilt should be instantly removed from the garden and burnt. This disease is easily identified by the appearance on the foliage — usually the main top growth—of bronze spotting, hence the name applied. In this instance no effective preventive is yet known, although it has been recorded that spraying of plants in the seed-bed with tartar emetic has given some protection. The main danger concerning this disease is the ease with which it may be spread by human contact. Removal and burning affected plants is the best method of protecting those remaining.

In sheltered gardens during early February, where staked varieties are being grown, a look-out should be kept for early colouring fruits. Birds are ever on the alert, and will destroy the first tomatoes by picking holes in them, and this may happen to a whole

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truss. When fruits are being removed they should not be "tugged" from the vines. If the proper method of pulling is not known, the stem of the fruit should be held with one hand and the tomato removed with the other. The best way to remove a fruit using one hand only is to grip it and force the stem away by pressing with the thumb.

Cabbages

Seasonal insecticidal treatment for these crops has already been mentioned, but regular cultivation and watering is essential. During continuous periods of dry weather uncultivated areas of the garden, particularly those occupied by annual growing crops, quickly lose the moisture necessary for plant development. Without the application of water, regular shallow hoeing is considered the best means of preventing evaporation. This creates a fine surface mulch which "breaks" the continuity of capillary attraction between the top layer of soil and that at lower depths.

Brussels sprouts, late broccoli and kale should, while being hoed, have a small quantity of soil drawn towards them. These plants grow taller than cabbage and are more likely to suffer greater damage in situations where high winds prevail. This precaution should be taken particularly with the first and last of the varieties mentioned, as soon as they begin to get top heavy. They will thus be braced against the prevailing wind.

Where water is available, regular applications should be made. Surface watering is not only useless, but dangerous to the destruction of plant roots, which tend to grow upwards when water in small quantities is used. Heavy watering induces deep rooting, which enables the plant to obtain food which may be stored at lower depths.

Leeks

These are rarely attacked by disease, but require regular hoeing and plenty of water. Weak liquid manure applied at least every two weeks — always after watering — will materially assist the development of the plants.

Lettuce

These should be treated in a similar manner to that recommended for leeks. Lettuce which are not brought quickly to maturity develop a bitter, undesirable flavour, and the surest method of producing crisp heads is by using liquid manure. This may be made either in the ordinary way, or by using nitrate of soda, 1 teaspoonful to a gallon of water.

Beans

Where early crops have become exhausted, seeds of a dwarf variety may still be sown in favourable situations, with every chance of obtaining a late crop. Sow the seeds only in moist soil and keep the surface loose after germination starts.

Celery

Plants for the main crop may still be set out in late January or early February in a part of the garden which has previously been well manured with the recommended fertiliser. During warm, dry weather it is better to water the plants in while setting. Only well grown, stocky plants with a healthy, vigorous root system should be set out. It will be quite impossible for weak, spindly plants to survive through adverse weather and drying winds.

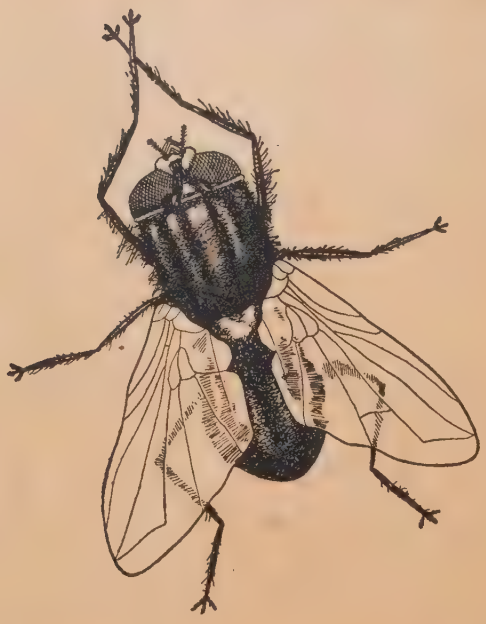
Silver Beet

"Giant Broad White Rib" (Curled Dark Leaf) is specially recommended for planting during February. Good plants, properly set and well cared for will give satisfactory yields until October. Liquid manure during the early stages of growth may be necessary to carry the plants over this difficult period. The plants should be set 8-10 inches apart in rows spaced 18 to 20 inches.

Spring Cabbage

The general opinion that spring cabbages can only be planted during the months of August or September is quite erroneous. It is during these months that green vegetables are usually in short supply; therefore the aim of the home gardener should be to

ISSUED BY THE DEPT. OF HEALTH



FLIES—One cause of SUMMER SICKNESS!

Summer sickness is due to infection. Anyone can get it, but babies are particularly prone. The symptoms are diarrhoea and vomiting, and in babies high temperature. Get the doctor at once, and give in the meantime water that has been boiled.

Artificially-fed babies get summer sickness from infected food such as unclean milk, or from unclean utensils and careless handling of food, from dirty hands and dirty 'dummies' (which are *always* unhygienic), and from FLIES which infect everything they touch.

In breast-fed babies, infection is usually due to neglect in care of the breasts. Nevertheless, for young babies breast feeding (with proper care taken) is the best preventive of summer sickness.

WAGE WAR ON FLIES

Here is the song of the fly:

Straight from the rubbish heap I come
I never wash my feet
And every single chance I get
I walk on what you eat.

Keep flies off all food. Stop them breeding. Keep rubbish in closed containers. Use household sprays liberally. Protect milk from flies, dust and dirty hands. Use pasteurised milk. Otherwise home pasteurise or scald it. Then keep it COOL. Keep all food utensils scrupulously clean and where flies cannot get at them.

Mother! Always wash your hands and scrub fingernails after attending to baby, and BEFORE preparing baby's food.

ONLY THIS KIND OF CARE WILL PREVENT INFECTION

12

FOR A HEALTHIER NATION

have ready for cutting and consumption a good supply of spring cabbages.

"Flower of Spring" is a variety that has justly earned the reputation of the most reliable early-maturing spring cabbage for general use. This particularly applies to the lower part of the North Island and the South Island. Further north an early variety of the round headed type is grown, or one of the Wakefields.

Seed should be sown late January or early February, either in boxes 6 inches deep or in the open garden. From the time the young plants show above the ground they are subject to attack by the usual brassica pests—aphis and caterpillars. Spraying with nicotine sulphate or Paranaph is necessary for control of the former and arsenate of lead, powder form, for the latter.

During March in the South Island and up to early April in the North Island will be suitable for planting. If the soil is inclined to be dry, the plants should be watered in, or "puddled" when being set. When the cool weather begins no further spraying with insecticides will be necessary.

—D. K. PRITCHARD,
Instructor in Vegetable Culture,
Wellington.

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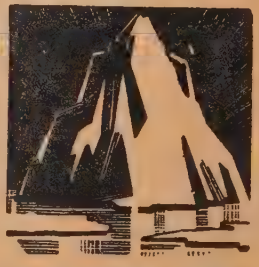

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Seasonal Work for Beekeepers

Harvesting in Preparation for Extracting

WHERE ample combs are available, it is possible to delay the extracting of honey until the end of the nectar flow, but the beekeeper will find it necessary to begin extraction earlier, in order to keep the bees supplied with the required comb-room for the storing of the incoming nectar. Wet combs can be returned to the hives at any time during the day when the flow is at its height, but should any sign of slackening be evident, the return of such combs should be delayed until the evening.

Colonies which are slow to build up in the spring often show a marked increase in development and activity at the beginning of the main honey flow which results in some hives having the brood chambers filled with honey. Where such conditions prevail, the brood combs that have been filled with honey should be removed, and, if the flow is at its height, replaced with sheets of foundation, or, if the flow is on the decline drawn combs should be given. It is important that the queen should have sufficient brood combs in which to lay at all times.

Removal of Honey

Honey is usually removed from the hives by one of two methods—by the use of smoke or with the assistance of bee-escape boards. The "Hodgson" ventilated escape board is perhaps the best type to use. It has a Porter bee escape fitted into the centre of a gauze screen, surrounded by a wooden frame after the fashion of a "Waldron" excluder It is advisable to have two escapes fitted into the screen, as, in the event of one of them blocking, the other will enable the bees to leave the supers.

The screen has the advantage over a board in that the bees are given ample ventilation, and when the weather is cold, the heat of the hive is enabled to reach the honey above after the bees have left the supers. Not more than two supers of honey should be removed at one time by the bee-escape method, as attempts to remove a greater number result in reluctance on the part of the bees to leave the supers. Escape boards should be placed under the supers of the colonies to be dealt with the night previous to the removal of the surplus honey.

Smoking Method

When removing honey by smoking and brushing the bees from the combs, there are occasions when a good deal of smoke is necessary to drive the bulk of the bees from the supers, but care should be exercised in the amount given. Only clean grain sacking should be used in the smoker, as an odour from the smoke may be imparted to the honey.

When harvesting honey in this manner it is advisable to take a barrow in to the apiary on which is placed an empty super to hold the frames of honey, and a clean sack for use as a cover. A bee-brush, or a small bundle of manuka tied together, is used for removing the bees from the frames. It is perhaps safer to use a fresh bundle of manuka for each hive in preference to a bee-brush, as the manuka can be burned, whereas, should there be unsuspected disease in the apiary, the bee-brush may be a means of spreading the infection.

Steps to be Taken

The hive should first be smoked at the entrance, and then under the lid, which is removed, together with the mat. Using the hive tool, the top super should be prised from the one underneath. The outside comb is then removed, and the bees dislodged at the hive entrance by giving the frame a sharp downward jerk, the remaining bees being brushed off. The frame is then placed in the empty super on the barrow, and covered with the sack. The remaining frames are then spaced, more smoke applied, and the bees brushed off the frame inside the hive. The complete super of honey, if desired, can then be lifted on to the barrow and the frame that was first removed replaced.

If it is intended to remove more honey than is contained in the top super, it is advisable to remove each frame singly, shaking and brushing the bees before the hive entrance, and lifting the frames into the empty super. When removing honey early in the season, none that is not three-quarters capped should be taken, and in the event of any honey shaking from the uncapped portion of the combs, the frames should be returned to the hive for further ripening.

There are other methods of removing honey from the hives and one that finds some favour with beekeepers is the use of disinfectants, particularly the carbolic screen. This method is not recommended as honey removed in this manner is likely to be tainted in some degree by the carbolic fumes.

Preparations

As honey is an article of food, cleanliness in the honey-house and in the handling of the product is essential. All utensils used in contact with honey should be thoroughly clean. The extractor and honey tanks should be scalded out before the commencement of extracting operations, and the honey-house should be washed out. All unnecessary articles should be removed from the extracting-room, as any restriction on free movement creates discomfort during the heat of the summer. Combs of honey should not be stored in the honey-house any longer than necessary, as should the weather turn wet the honey may absorb moisture from the atmosphere. This applies also to extracted honey in the holder tanks, which should be carefully covered against exposure to moist air, dust, and other contamination.

At the conclusion of each day's work, the floor of the honey-house should be thoroughly washed, and the wash bucket and floor mops similarly treated. Further precautions that should be observed during the extracting period are to avoid removing honey from the hives, or extracting, during wet weather. Do not expose combs of honey after the cappings have been removed, or leave cappings and the honey from cappings exposed unduly to the atmosphere. Every care should be taken to see that at no time do the tubes which form part of the steam-heated uncapping knife develop leaks, and that the knife itself has no flaws in it capable of admitting steam to the honey or uncapping can.

—R. S. WALSH,
Apiary Instructor, Auckland.

Manuring of Garden Crops

BULLETIN 105, published by the Department of Agriculture, is designed to give full information to the home gardener on the manurial requirements of his crops. Write for a **free** copy to the Department of Agriculture at Auckland, Wellington, Christchurch and Dunedin.

Notes for the Poultry Farmer

Poultry-Keeping As a Source of Income

— By —
F. C. BOBBY,
Superintendent of Poultry Husbandry, Wellington

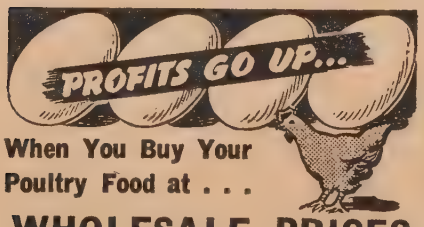
FOR those who favour an outdoor life, poultry-keeping offers many attractions, but, unfortunately, all too often, insufficient consideration is given before a start is made to the many aspects of this method of obtaining a livelihood. For this reason, the whole subject will be freely and frankly discussed.

In the first place, "poultry-keeping" may have a wide meaning, but can perhaps be described under three main headings, namely:—

(a) Keeping a small unit of poultry, with the object of supplying the household with eggs—often referred to as "backyard poultry-keeping."

(b) Keeping a comparatively small flock of poultry for the purpose of augmenting an income obtained from some other activity—in other words, "side-line poultry-keeping"; and

(c) Keeping sufficient head of poultry to enable a living to be made—"commercial poultry-keeping."



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Backyard Poultry

Keeping backyard poultry is popular with many people living in, or near to, a town or city. Six or twelve laying birds, properly housed and managed, will ensure an adequate supply of fresh eggs for the average household. The knowledge of poultry required is limited, while the cost of producing eggs, with the aid of scraps from the house and green-food from the garden, can be kept to a minimum. In turn, the garden will benefit from the poultry manure produced, if used with care. However, a few words of warning would not be out of place.

Once obtained, these few birds require regular attention for seven days of the week, and according to the care meted out to them so will be the returns obtained. In ordinary circumstances, backyard poultry-keepers are recommended to obtain grown pullets for their replacements, and not to trust to raising pullets from day-old chicks with improvised brooder-housing and equipment. Leave hatching and chick-rearing to the skilled poultry-keeper. Poorly-reared pullets rarely give satisfactory egg-production.

As this article is written mainly for the reader who is considering commercial poultry-keeping, those who are interested in backyard poultry are referred to a special pamphlet, entitled "Backyard Poultry-Keeping," issued free on request to the Department of Agriculture.

Side-Line Poultry

Part-time poultry-keeping is eminently suitable for the farmer who is within a reasonable distance of an organised and satisfactory egg market. Often cost of production may be reduced considerably by the use of by-products from the farm, such as curd made from surplus skim-milk, or by home-grown foods suitable for poultry. In addition, in many instances, the birds can benefit from running over ample grass paddocks on free range, which method of management is probably the greatest insurance against loss of constitutional vigour and subsequent losses from disease.

Side-line poultry-keeping may also serve to augment appreciably an income obtained from permanent employment in some industry other than primary production. A number of successful poultry-keepers have started in this way. Valuable experience may be gained with a limited head of poultry while the main income is obtained by other means. Ultimately, a position is reached where sufficient experience has been obtained to allow the increasing of the poultry to a number sufficient to ensure an adequate income from poultry-keeping alone, when the employment in other work may be terminated.

Among small, side-line poultry-keepers are also found the many enthusiastic fanciers who consistently support poultry shows throughout the Dominion. Since side-line poultry-keeping may easily involve a few hundred birds, it is essential that some knowledge be acquired before making a start on this basis. Alternatively, a small number of birds only may be kept in the early stages, and experience purchased gradually without unduly heavy financial losses.

Commercial Poultry-Keeping

This is poultry-keeping run as a business, and upon which the owner is dependent for his livelihood. It is the aspect of poultry-keeping with which this article is mainly concerned, and the information and suggestions given are for those contemplating poultry-keeping as a means of livelihood in the future.

DOES POULTRY-KEEPING PAY?

The above is invariably the first and obvious question for a prospective poultry-keeper to ask. Without doubt, even on straight-out egg-production alone, good class poultry, well managed, can be made to show a profit in normal years. However, this is only a vague answer to the above question, because, for obvious reasons, the extent of the income to be made out of poultry is a vital question. In point of fact, it is a most difficult question to answer satisfactorily, as so many factors are involved; such as the personal element, the class of stock maintained, the locality of the farm, etc., to name only a few.

It is also particularly dangerous to suggest even reasonably optimistic figures, since the newcomer to the industry may fail to reach such a stand-

ard of income, and will immediately feel that he has been misled. There is no particular reason, however, why the efficient egg-producing poultry-keeper should not return to himself for his labour £4 to £5 a week, while, as he becomes established and is able to add to this by the sale of hatching eggs and day-old chicks, an increase in income may be anticipated. There are poultry-keepers who have been, and still are, earning incomes far in excess of the figures named.

IS EXPERIENCE ABSOLUTELY NECESSARY BEFORE STARTING?

There can only be one answer to this question, and it is emphatically "yes." Ordinary people, of average intelligence, with limited capital, do not think of starting a business in competition with others until they have acquired some knowledge of business methods and of the particular avenue into which they contemplate sinking their capital. Yet, only too often, persons with little or no knowledge of poultry are prepared to rush headlong into poultry-keeping on a commercial scale. They may survive, but they pay heavily for the experience gained while establishing successful plants.

Perhaps this idea that poultry-keeping is a comparatively easy occupation is born of the fact that it is relatively easy to run profitably a small unit of, say, one or two dozen laying birds. Careful records are kept of direct expenditure and receipts, and a handsome profit is shown for such a small unit. The fatal mistake is then made of thinking that if this size of flock is multiplied by, say, 50, the profits to be obtained **will be in a direct ratio.** Additional cost factors not accounted for in small units affect the results obtained with the commercial flock, but probably the foremost factor in reducing the proportionate profits is insufficient knowledge of the practical principles of poultry husbandry.

Although much valuable knowledge may be acquired by reading and absorbing information from text books or bulletins published by bodies interested in poultry education, such as the Department of Agriculture, sufficient knowledge for starting up in business cannot be obtained solely in this way. To this information obtained from printed matter must be added **practical experience.** The two combined afford the newcomer to the poultry industry the best chance of success on his own plant when a start is ultimately made.

OTHER ESSENTIALS AND FACTS.

The prospective poultry-keeper should first be entirely satisfied that he likes poultry. Poultry-keeping is not mechanical work. As is the case with all successful farmers, the poultry-keeper should have a real liking for, and pride in, his stock. Some poultry-keepers are blessed with a natural "stock sense," while others acquire this valuable asset as they work with their birds. Successful breeding, and consequently successful poultry-keeping, depend to a great extent on the ability to select the right class of bird, and in turn this essential depends on "stock sense." Unless the prospective poultry-keeper has a natural liking for birds it will be difficult to acquire this aptitude.

Practical poultry experience in itself is not all that is required. The prospective poultry-keeper should have a sound fundamental knowledge of basic business methods, and be capable of buying and selling to the best advantage, while an elementary knowledge of the keeping of accounts and the recording of production and other figures is an essential.

Before starting a poultry-farm, it is necessary to face the fact that poultry-keeping means long hours of work daily throughout the year for a relatively moderate income when compared with many other occupations. There is nothing simple about commercial poultry-keeping. It probably offers more problems over a period of time, and requires greater attention to detail, than any other branch of farming. Day in and day out, poultry require careful attention if the best results are to be obtained. Against this, there is not an undue amount of heavy work. It is a healthy life, which to the enthusiast can be full of interest and of considerable pleasure.

Lastly, it may be mentioned that practical knowledge of arable farming is definitely of value. Poultry require considerable quantities of green food, and a knowledge of when to sow, and how to cultivate, suitable crops is of infinite value to the new poultry-keeper.

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CAPITAL REQUIRED.

Here again is a question of vital importance to the newcomer, but today one of the most difficult to answer. To the uninitiated in poultry-keeping it may appear a fairly straight-forward question, but to those with experience it is one bristling with difficulties. It is necessary, therefore, to explore the more important factors involved.

Selection of Land

The amount of land required will depend to a large extent upon the system of management proposed, and the cost will vary widely, according to the locality and class of land selected. It is important to consider the distance from the nearest centre where produce can be marketed, and the cost of obtaining the necessary foods and other purchased commodities when selecting a site for a poultry-farm. This will obviously be a factor in the value of the land.

Buildings

Another capital expenditure, and one that may vary considerably, is the dwelling-house, whether built or purchased. The size of the family and the individual requirements make this a varying factor.

If a complete commercial poultry unit is required, the necessary buildings will include an incubator-room, brooder-house, growing houses, laying sheds, food store, and egg-room. To these must be added fencing for poultry-runs, and probably some roading. It will be appreciated that the cost of these will vary considerably according to the constructional ideas of those concerned, while much will depend upon whether the owner is able to build for himself or is dependent upon employed labour. Obviously the former is the cheaper method of establishing a farm, and a full practical knowledge of carpentry is a valuable asset to the prospective poultry-keeper.

Equipment and Stock

Equipment may include an incubator, hovers for rearing chicks, feeding and water utensils, etc., and capital expenditure will depend upon individual tastes. While some will buy the finished article, others will construct and improvise in order to reduce capital outlay.

Expenditure on stock will depend to a considerable extent upon the method of starting.

The lowest initial capital expenditure is perhaps involved by purchasing hatching eggs, but a lengthy period will elapse before the first returns can be expected.

If partially-grown pullets are purchased, a higher cost is involved, but quicker returns will be obtained.

Living Expenses

It is necessary to take into account living expenses over the period covering the first stages of construction of the new farm, if built, and the receipt of the first returns. Here again, the purchase of a going concern at a higher initial outlay may be considered satisfactory, as money will be coming in from the outset.

Sufficient has been said to support the statement that it is particularly difficult to estimate capital requirements. Although it is not suggested that capital should be expended lavishly, newcomers to poultry-keeping are warned against any attempt to start on a commercial basis with a strictly limited capital. It can be done, but it involves a long struggle to attain a reasonable standard of living. There are no short-cuts to substantial profits with a small capital outlay in poultry-keeping. Thus, as a rough guide, the prospective whole-time poultry-keeper should be backed by an anticipated figure of 45/- to 50/- per laying bird.

NUMBER OF BIRDS AND LAND REQUIRED.

Speaking generally, an able-bodied man can manage efficiently throughout the year between 800 and 1,000 laying birds, and this is the size of unit to be aimed at for economical working. If a boy is employed, this number may be raised to approximately 1,500, and where a man is added the number may be at least doubled. These figures are given as a guide only, and it is assumed that the man in question has obtained the necessary practical experience before starting.

Regarding the question of land required, it is more difficulty to be explicit, since the system of management chosen is a major factor. Obviously, less land is required where laying stock are maintained under the intensive system, i.e., confined to their laying-sheds. It is suggested that where birds are allowed runs, no more than 250 laying birds should be run to the acre, but this figure may be increased to 350-400 for young, growing birds, if the land is used only for this specific purpose and is spelled between rearing seasons. Land should also be set aside for growing adequate supplies of green food.

Thus, a unit of 1,000 laying birds will require not less than six acres, including the ground for the owner's dwelling and garden.

When purchasing land, it is advisable to explore the possibility of obtaining additional ground adjacent to the property, in the event of a later decision to increase the head of stock maintained. Owing to the relatively high price of land in New Zealand, there is a tendency to over-stock with poultry, resulting in an increased danger from diseases, particularly those caused by internal parasites, such as coccidiosis and worms.

(To be continued.)

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Feeding Pullets on House Scraps

E.H.S. (Penrose).

I have only a small flock of 30 pullets—leghorns—running on free range and fed on house scraps and pollard and bran mash with no meat-meal. I use a little grain. Recently I was able to buy cheap (1d. a lb.) some shredded suet which was just slightly rancid and rejected for cooking purposes. I am feeding this suet in the mash at the rate of 4 oz. per day and every day.

SUPERINTENDENT OF POULTRY HUSBANDRY:—

In the first place, I would say that the use of pollard, bran, and house scraps is sound, but must point out that better results are likely to be obtained during the winter by adding about 8 per cent. of meat-meal. In this connection, much depends on what is included in the house scraps. On the average, house scraps contain insufficient meat to supply birds with an adequate supply of protein during winter. Although your birds are on free range, insect life in winter is not available in sufficient quantities to augment the house scraps completely. For these reasons I would advocate the use of meat-meal.

With regard to the use of suet, this concentrated fat is of little use to laying pullets and certainly not a desirable food for them. It will have a tendency to fatten your birds, especially those which are not high producers. As a food for poultry it is usually restricted to birds being fattened for table purposes, and even for this purpose I would prefer not to use a rancid fat.

Federation of Young Farmers' Clubs

Meeting of Dominion Executive Committee

A MEETING of the Dominion executive committee was held in Christchurch on Thursday, October 21 last. Those present were Messrs. T. E. Streeter (Dominion president), S. G. Avery (Dominion vice-president), R. Wightman, Jnr. (chairman, Canterbury council), D. S. Ross (immediate past president), J. Wilson and E. Rabbidge, Jnr. (Otago-Southland council), James Barclay and S. A. La Roche (Canterbury council), B. J. Collerton (Wellington council), F. S. Atchison (Auckland council), J. W. Calder (Lincoln College), W. A. Jacques (Massey College), A. P. O'Shea (N.Z. Farmers' Union), and S. Freeman (Dominion organising secretary).

Apologies were received from Messrs. L. J. Wild (grand patron), P. W. Smallfield (Director of the Fields Division), A. C. Cameron, A. S. Trotter, R. E. White and S. R. Whyte (Otago-Southland council), C. J. Craig, M. Donald, and W. F. McLaren (Wellington council), G. Spratt and A. F. Walter (Auckland council), C. H. Schwass (Department of Agriculture), and J. H. Bremner (N.Z. Farmers' Union).

President's Address

The President, Mr. Streeter, who was at the time convalescing after an operation, welcomed the delegates and referred to the good representation, particularly from the North Island. The meeting was not a big one, but he realised the handicaps imposed by war conditions and the difficulty that many members had in attending meetings at any great distance. He mentioned the work done in the North Island on his behalf while he was laid up by Mr. D. S. Ross, as immediate past president, and also by Mr. S. G. Avery (Dominion vice-president and chairman of the Wellington council), who had attended, with the organising secretary, a meeting of the Auckland council at Tauranga, and two combined club meetings in the Bay of Plenty.

He, himself, had been able to attend a meeting in August of the Otago-Southland council at Invercargill, and had spent a most interesting and instructive time on the day following at a field day at Bluff, concluding with a district debate at night. He referred to various matters that had occupied the attention of the annual general meeting in July last, and, in particular, mentioned the formation of a strong club at his old school, St. Andrew's College, Christchurch. He expressed appreciation of the co-operation and assistance that he had received, and the progress that the organisation was making.

Club Activities

Among other matters, the meeting dealt with the policy of the Federation as laid down over a year ago. This had been discussed and reaffirmed at subsequent Dominion executive committee meetings and at the annual general meeting in July last. It was considered that the scope of this covered the ground fully in encouraging the formation of new clubs and the revival of those in recess. An application to affiliate with the Federation was received from a club formed in connection with the Education Department's correspondence course carried on by Dr. Butchers. The affiliation was approved and granted.

A brief report covering the position of the clubs throughout the Dominion, and their activities generally, was given by the organising secretary. Other reports were received from sub-committees set up to deal with the following: "Y.F.C. memorial," "Development of cultural and aesthetic values," "Y.F.C. propaganda film," and "Rehabilitation committees." Results of the national essay competition were announced. Publicity has been given to these in the November issue of this Journal.

Affiliation Fees

A remit from the Wellington council suggesting the returning of part of the affiliation fee to all clubs on account of difficulties connected with membership and finance was lost, it being considered that any individual cases of hardship could be dealt with by councils in the usual way and recommendations made regarding the writing off of such fees where necessary.

At the request of the chairman the meeting stood in silence for a few moments as a tribute to the memory of the late Mr. W. G. Brownlie, and a vote of sympathy with his relatives was carried.

The date of the next Dominion executive meeting was left to the chairman and secretary to arrange, it being suggested that it should be about the middle of April next. The meeting closed with a hearty vote of thanks to the chair.

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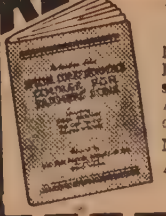

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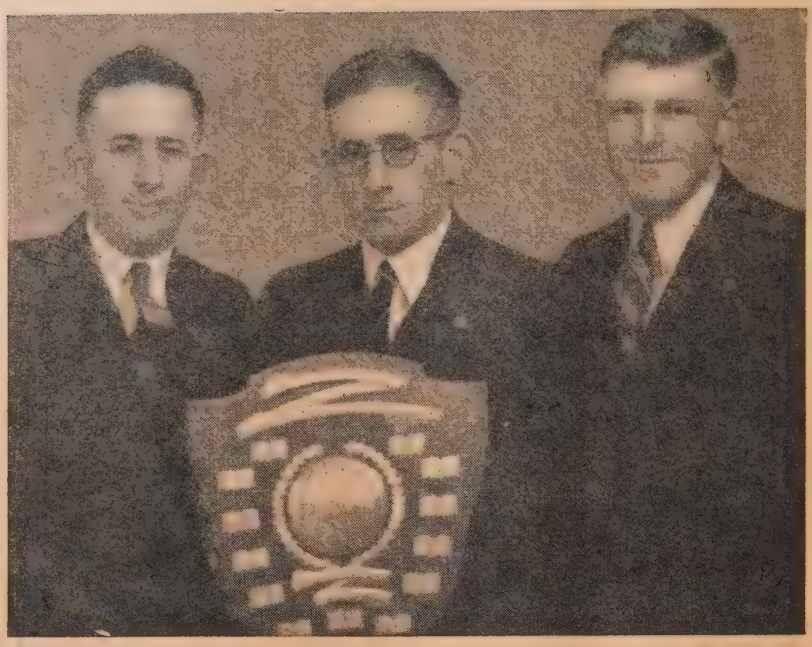
Bay of Plenty Inter-District Debating Competition

THE debating championship for the Bay of Plenty shield for 1943 was won by the Te Puna Club of the Western Bay of Plenty District.

In this district, six teams took part, and the competition was keen. As there were four teams in the Te Puke end of the district, and two at the Tauranga end, by a process of elimination the winning team from the Te Puke end, Paengaroa A, met the Te Puna team, as winners of the Tauranga end, for the final of the Western district.

This arrangement gave the winners only two debates, but as the subjects were controversial, each team had to put a good deal of work into the preparation of its addresses. Some idea of the keenness can be seen when it is stated that the Te Puna team, taking the affirmative, gained the decision over the Tauranga Club team by a margin of only one point. The subject was "That New Zealand can support a population of twenty million inhabitants."

The subject for the final debate was "That in Modern War, Air Superiority is of more importance than Naval Superiority." Te Puna took the negative side in this case, and won by the fairly comfortable margin of nineteen, but this was not due to the other team being in any way weak. It was most unfortunate that the Waimana team (Eastern Bay of Plenty) was unable to take part in the contest, the award being given against them by default. The Te Puna Club team consisted of K. I'Anson (leader), C. Foster and A. O. Lloyd.



The debating team of the Te Puna Young Farmers' Club, winners of the debating championship for the Bay of Plenty shield for 1943. From left: C. Foster, K. I'Anson (leader) and A. O. Lloyd.

Pasture-Judging Competition

DESPITE the wet weather previously experienced in the district, there was a good attendance at the Methven Young Farmers' Club's first annual pasture-judging competition, which was held at "Three Springs," the very fine property of Mr. A. J. McKay.

The organising of the competition itself was done by Messrs. G. K. McPherson and R. Inch, both of the Department of Agriculture, Ashburton. Mr. McPherson also kindly acted as judge. Mr. Inch, incidentally, is the hon. secretary of the Mid-Canterbury district committee.

Four plots were marked out in separate paddocks, and each competitor was supplied with a form on which he had to assess the percentage of points to each type of plant, such as grasses, clovers, weeds, etc. The whole party judged each plot individually, after which the forms were collected and submitted to the judge. The member whose points and comments were nearest to those of the judge was J. B. McKendry, who received Mr. F. G. Oldfield's challenge cup (valued at £10) and a miniature cup. W. Stevens and J. Stone tied for second place.

Later in the afternoon, Mr. Inch conducted the party over some experimental plots which had been laid down on Mr. McKay's property by the department. Mr. Inch demonstrated some very interesting points, which could be clearly seen in the plots themselves. A very enjoyable afternoon tea was supplied by Mrs. McKay and Mrs. Stone. At the conclusion of a most interesting and instructive afternoon, a vote of thanks was passed to all helpers, and it was carried by acclamation.

Competitors making notes at the first annual pasture-judging competition of the Methven Young Farmers' Club, held at Mr. A. J. McKay's property, "Three Springs."

Afforestation

THE following article, written by W. Black, was read at a meeting of the Paengaroa Young Farmers' Club, and is published here at the request of that club.

Too many people are apt to think that the subject of afforestation is always connected with the question of erosion. Nothing could be further from the truth, as the keeping of a correct balance between cleared country and forest has a vital bearing on our climate, especially on the rainfall, which directly affects every man, woman and child in the country. As regards the percentage of areas to be planted to give a correct balance, it may be that our Forestry Department has already worked that out.

If not, expert advice should be obtained from Europe or India, where afforestation on a large scale is carried out under conditions of a rainfall similar to our own.

I have been told by some "old-timers" (and have no reason to doubt the fact) that much of the cleared high-country in the south of the North Island is, at least, a month later in coming into production in spring, as compared with the time, say, forty years ago, before man so ruthlessly destroyed so much of the native cover.

A suggestion has been made to me by a friend that areas on high country towards Motu will regenerate themselves in 25 years. In my opinion, that method is too slow and uneconomical, as, by assisting nature, many more trees per acre can be produced. While all young native trees such as the Taxads should be preserved, there should be more competition with the native growth, such as Criptomeria Japonica.

Fire-breaks

This brings me to another matter, and that is fire-breaks as we have them at present. I suggest that if a workable substitute can be found for the present system, it should be adopted, as it must be admitted that the system followed up till now is both expensive and uneconomical, the areas being exposed to erosion, and serving as a breeding-ground for noxious weeds. My suggestion is that a resolution be passed urging the investigation of the possibility of procuring trees or shrubs that are impervious to fire, or at least, so much so as to take the place of the present fire-breaks.

Some years ago there was a report that a hybrid pine which was fireproof had been produced in the U.S.A.

To produce plants or trees very resistant to fire should not be beyond the power of scientists, who, during the last two decades in America, Europe and Asia, have performed miracles in producing a number of hybrid strains and new varieties of plants.

These have proved to be of wonderful economic value. In this search, the possibility should not be overlooked that there may be certain varieties of shrubs in our own land which might be suitable for fire-breaks and which might also furnish drugs of commercial value.

Fern and Scrub

I would like to refer to the settlement of the large areas of fern and scrub land, such as those between Tauranga and the Lakes; areas like Roydon Downs and adjacent land; also that block between the coast and the lakes, extending from Pongakawa to Manawahe.

After the war, if conditions return to normal, and there is a reasonable demand for our primary products, especially meat and wool, there is bound to be a move in the direction of doing something with these lands. Some of the conditions necessary to allow this to be done on an economical scale would be (1) a comprehensive scheme for water supplies, which would mean large quantities of piping, and (2) ample supplies of cheap fertilisers, especially in the initial stages, and a cheap method of distributing the fertiliser.

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The latter problem will, I feel sure, be solved by the use of planes adapted for that purpose. This is no longer in the experimental stage, as for years, in U.S.A. this means has been employed for dusting cotton crops to control disease. Needless to say there will be no lack of operators for such machines after the war is over.

This land should be handled in big areas, and none of it cut up for settlement until it is grassed—the main fencing and buildings to be erected on much the same lines as those on the areas of Rotorua.

In conjunction with any settlement scheme of the above nature, club members should endeavour to work in the direction of the preservation of an adequate balance between cleared land and areas planted in trees, with a tendency to a larger proportion on steep country where erosion would be more pronounced.

Timber for Posts

In tree-planting for the Bay of Plenty, more attention should be given to the planting of a reasonable proportion of trees that would be suitable for posts, such as Prickly Acacia, Macrocarpa, and suitable Eucalypti. Had a few thousand acres of these trees been planted in various parts of the bay, say thirty years ago, there would be no post problem facing us today. In that respect, the old generation, like myself, are much to blame, in that we were so taken up with our own individual affairs that we had no time to consider these matters from a district or a national point of view. Consequently, the country generally, and the individual in particular, is the poorer today; it is therefore up to the younger generation to see that they do better.

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Te Puna Gymkhana

THE feature of Labour Day in the Te Puna district was a gymkhana, held under the auspices of the Te Puna patriotic committee, which had asked the local Young Farmers' Club for support in an endeavour to make the function a success. At comparatively short notice in which to prepare a programme, the members of the club settled down to business, and their whole-hearted co-operation was largely responsible for Te Puna's quota to the patriotic funds being assured.

A "Popular Girl" competition was instituted, and after selecting four girls as competitors, a sub-committee of three Y.F.C. members was elected to work on behalf of each girl. All money raised by the Y.F.C. effort at the gymkhana proper, and at the dance at night, was divided equally and credited to each girl, so that the efforts of the winning competitor and those of her committee were responsible for her success.

At the gymkhana, the Y.F.C. conducted a stall for the disposal of produce donated by members of the district, as well as numerous side-shows.

The Te Puna Club has a membership of twenty-two, all of whom are keen to assist the movement and to help with various public functions in the district.

—A. O. LLOYD, Chairman,
Te Puna Y.F.C.

Don't

allow any part of the garden to be without a crop. If not planted with a vegetable crop, dig over and sow to a cover crop. When dug, the humus-content of the soil will be increased and depleted fertility restored.

Lincoln College Scholarships

THE selection committee appointed by the various South Island councils of the N.Z. Federation of Young Farmers' Clubs announces that it has awarded the 1944 Lincoln College Old Boys' Association scholarship to James M. Crawford, of Invercargill.

Crawford is 19 years of age, and has been both chairman and secretary of the Dipton Young Farmers' Club, which is one of the most active in Southland. He was educated at the Southland Boys' High School and Southland Technical College, and has had two years' farming experience at Dipton and Glenorchy. The reports on his work indicate keenness and reliability.

Special Scholarships

The selection committee also recommends Allan Raymond Rankin, of Dunedin, and Patrick Hugh McGloin, of Springbank (Canterbury), for special Lincoln College scholarships. These two Young Farmers have been placed second equal, and have excellent records.

Rankin was educated at the Otago Boys' High School, where he was head house-prefect and form captain, and took a leading part in all games and other activities. He has spent a year on a farm at Berwick and is a member of the West Taieri Young Farmers' Club. He is 18 years of age, and has established an excellent record for dependability.

McGloin was educated at Rangiora High School, where he has a good record. He has been working on his father's farm at Springbank for four years, and during that period has been a member of the Cust Young Farmers' Club. McGloin has taken a very active part in many of the organisations in his district, being hon. secretary of the Patriotic committee, sports committee, and St. John Ambulance Association, and he is very highly thought of in the district.

High Standard

The committee was impressed with the uniformly high standard of the applications submitted, several being passed over because the applicants were finishing up at school this year and lacked farming experience.

The personnel of the Selection Committee is as follows: Mr. A. C. Cameron (Dunedin), chairman, Mr. J. W. Woodcock (Fields Superintendent for Otago and Southland, Department of Agriculture), Mr. W. R. Harris, Invercargill (past president, Otago and Southland council, N.Z. Federation Young Farmers' Club).

—S. R. WHYTE, Hon. Secretary, Otago Southland Y.F.C. Council.

Reports On Club Activities

WESTERN SOUTHLAND.

Wyndham.—Members appointed to assist at local A. & P. Association show. Lecture on "Research," by Mr. Sandys Wunsch (a member of the Industrial Research Council). Eleven members present out of a total of 15.

SOUTH OTAGO.

Warepa.—Report of the proceedings at the South Otago district committee meeting given by a club delegate. Secretary to write to R. Agnew, Kaihiku, a club member, expressing appreciation of his donation of £1 to club funds. Interesting and instructive lecture on "Concrete" by Messrs. A. J. McD. Millar (River Trust engineer) and J. T. Bell, of Inch Clutha. Mr. Miller gave a detailed account of the composition and manufacture of cement, the time different varieties take to set, grading of sand and gravel when mixing concrete, proportions in which to mix sand, gravel, and cement, the making of a home-made mixing machine, and methods of applying agitation to wet concrete. Mr. Bell dealt comprehensively with the making of concrete fencing posts, fixing the reinforcement in them, the kinds of moulds in use, and the laying of concrete paths. Eleven members present.

NORTH OTAGO.

Enfield.—Arrangements for dance in the local hall, proceeds to go to the soldiers' parcels fund. An interesting demonstration on "Rope-making" was given by Mr. T. Wilkinson, a local farmer. There were ten members present out of a total of twenty.

CHRISTCHURCH.

Ellesmere.—Four letters read from members overseas expressing thanks for parcels. Decided to send Christmas cards to members in the Forces. Impromptu speeches by members formed the programme for the evening. The speeches were:—"Land Settlement" (D. Hurford), "The Ranfurly Shield" (D. Young), "The Linen-flax Industry" (N. Lambie), "Irrigation in Canterbury" (O. J. Osborne), "The War in Europe" (L. McLachlan), "Artificial Fertilisers" (G. Osborne), "Raising White Clover for Seed" (A. Cameron), "Should a Show be Held: Reasons For and Against" (P. Abbot), "The War in the Pacific" (F. Bishop), "My Idea of an Ideal Holiday" (P. Ford), "Drainage in Ellesmere" (A. Reid), "The Land-girl Scheme" (I. Kimber), "Winter Feeding of Stock" (I. Hamilton), "Ways of Improving the Y.F.C. Movement" (A. Lockhead), "Tree-planting for Shelter" (L. Todd), "Stock Diseases" (I. Winchester), "Lucerne Growing" (A. Brown), "Dairy Cattle" (R. Marshall), "Addington Market" (A. Godsell), "Electric Power" (G. Amyes), "War in the Air" (H. Stephens), "Is New Zealand Under-populated?" (P. Benny), "Public Works" (I. Anderson). There was an attendance of 23 out of a total membership of 47.

Darfield.—Business meeting. Arrangements for a barn dance, to be held in Mr. C. O. Redfern's barn. Mr. J. Duncan appointed hon. secretary. The present secretary, Mr. G. Eaves, is leaving the district. Twelve members present.

MANAWATU.

Bunnythorpe.—Business meeting. Hall hire charges, £2, passed for payment. Next meeting to be held in February—recess period of two months on account of seasonal work. R. Clevely appointed steward of the Y.F.C. section at the Bunnythorpe Women's Institute show. Seven members present.

WAIRARAPA.

Carterton.—Club debate, subject, "Combined Farming v. Specialised Farming." The supporters gained the award by a narrow margin. It was decided that, at the next meeting, each member should select and read an interesting article from the "Journal of Agriculture," to form the basis of discussions. Sixteen members present.

Masterton.—Arrangements finalised for the club's 10th annual party-dance. Secretary instructed to write to Acting Flight Lieutenant J. Wright, congratulating him on being awarded the D.F.C. Details were given to members of the stock-judging competition to be held at the Wairarapa Show. Attendance of twenty-one.

SOUTHERN HAWKE'S BAY.

Dannevirke.—Five new members enrolled. An invitation was extended to land girls, and the chairman and Mr. L. Feierabend welcomed the three who were present. Report by secretary on the recent Southern Hawke's Bay district committee meeting. Decided to hold annual meeting on the third Friday in March. Letter of sympathy to be sent to H. Speedy, vice-chairman, on the death of his mother. Talks were given as follows:—L. Kuru, "A Week-end Visit to Massey College"; Mr. L. Feierabend, "The Use to Which Bones were put in England during the War"; "Mr. H. Chrisp, of the State Advances Corporation, and an advisory member of the club, "Rehabilitation." There was an attendance of thirty at the meeting.

BAY OF PLENTY.

Tauranga District High School Club.—Attendance of twenty members who met in order to revive the club, which had been in recess for some time. The following officers were elected: Advisory president, Mr. H. Reid; chairman, J. Crawford; secretary, D. Carter; treasurer, G. Rolandson. With a membership such as this, the club has every chance of success.

Whakatane District High School.—Lecture and demonstration on the use and care of bees, hiving a swarm, and building the hive. Twenty members present out of a total of twenty-five.

NORTH AUCKLAND.

Kaukapakapa.—Correspondence and discussion regarding the proposed local train service. Lecture on "The Fertiliser Position" by Mr. P. S. Syme, Department of Agriculture. There was an attendance of twelve members out of a total of forty-one.

Health Notes for the Farm

The Tragedy of Cancer

Contributed by the
DEPARTMENT OF HEALTH

IF CANCER in its early stages caused half as much pain as toothache, for example, the present high death-roll from this disease would be reduced to much smaller proportions. The tragedy of cancer lies in the fact that it develops slowly and painlessly, and often the victim is not made forcibly aware of it until the pain is felt. Then the chances of recovery are greatly diminished, and frequently are non-existent.

Tests have indicated that the patient is responsible for delay between the first symptom and a visit to the doctor in more than three-quarters of the cases. A series of cases recently checked showed that eight patients out of ten held back too long after the initial symptoms occurred. Some thought their symptoms were not serious enough, some failed to recognise the grave nature of the trouble, and others again waited until their economic affairs were more favourable. The first reason for delay was the most common—people simply put off going to the doctor because they didn't attach enough importance to signs that should have suggested cancer to them.

Early Attention

Cancer can be cured if it is attended to early enough. This is one of the most important messages the medical profession must get to the people. The public must be made to realise that cancer in its early forms is curable. If they appreciate this, they will go to their doctors at a time when disaster can be averted. Further than this, they should know that there is no phase of disease affecting man which is under more careful or more thorough investigation. And when science knows how to cure cancer by some specific method, it will be broadcast throughout the world immediately. In the meantime credulous people should beware of the quack who guarantees magic cures. There is no such thing.

Now, what does science know about cancer? Well, it does know that it is not contagious—it is not a germ disease like pneumonia or tuberculosis—and that, in itself, it is not hereditary. Those two facts are of the utmost importance to the lay public, and should dispel much misdirected thinking. Another thing science has proved about cancer is that it can be produced by chronic irritation. Repeated injury at the same spot over a long period of time does play a definite part in the production of cancer. Early workers with the X-rays found this. In certain parts of India, where the bullocks draw carts by a rope placed round their horns, repeated injury occurs at the point where the rope rubs at the base of the horns. After years of such injury, skin cancer develops. Cancer of the bladder is known to develop in persons employed in the dye industry. In the Kashmir Valley in India, the inhabitants have a habit of carrying small braziers of coal against their chests in winter time to keep warm. Repeated burns on the chest have caused skin cancer to develop.

Experimental Cancer

Experimentally, cancers have been produced in animals by the repeated injection of a chemical irritant, or by painting an irritant, such as tar, repeatedly on the skin.

Chronic irritation, however, does not necessarily mean injury by force. It might be that the juices which digest the food are a source of irritation, or it might be chronic irritation due to bacteria or parasites; or perhaps the exposure of tissues used to a certain environment; or to chemical irritants produced elsewhere in the body than in the tissues themselves. But, even beyond irritation, there must lie another cause, and it is this unknown factor for which science is busily probing.

It will be seen, then, that cancer is a complex disease, requiring drastic measures. The attack must be made early. By getting medical advice without delay, people with lumps, ulcers, signs of irritation, and other suspicious symptoms, may save themselves untold distress.

Substitutes for Food-values in Butter

WITH the introduction of butter rationing, it is important that people should know the foods that can help to compensate for the loss of food value normally supplied by the quantities of butter to which they have become accustomed, says a statement issued by the Department of Health.

In the first place, butter is butterfat, and the two other foods which contain butterfat are milk and cheese. The amount of milk normally required is two glasses for adults and three to four glasses for children daily. With less butter available it is necessary that all of this milk—and more, if possible—should be used. The top creamy milk should be saved for the children's porridge and pudding.

More cheese should be used. Grate it in salads, eat it in chunks with bread and a little of your butter, or cook it for the evening meal.

An important constituent of butter is vitamin A, which enables the body to resist infection, and also helps to avoid the condition known as night-blindness. Vitamin A is present, for example, in eggs and liver. Cheese, eggs, and liver are all foods which can form part of the tea meal—the meal at which so much butter was eaten.

The green and yellow vegetables—leafy vegetables, carrots, kumeras—can all help in providing vitamin A. So can tomatoes.

To replace the vitamin A, then, use milk, cheese, eggs, liver, green and yellow vegetables and tomatoes.

For baking purposes, dripping clarified at home may be used, and if the butter for spreading runs out, salted beef-dripping in which an onion has been cooked, is suggested as a substitute.

To sum up, the following foods will help to make up the deficiency by butter restrictions: First, milk and cheese; second, eggs and liver; third, green and yellow vegetables and tomatoes; fourth, salted beef-dripping for spreading on bread; fifth, clarified dripping for baking.

THE GOOD NEIGHBOUR.

NEW YEAR! Heartening words, these, heralding the completion of a chapter, and the turning to a fresh page in the book of human experience—a page free from all blots and errors, and on which the record of joy and pain, hope and achievement has yet to be written. Here is a glorious opportunity for us all to make a new beginning.

In many eastern countries, bonfires are a special feature of New Year celebrations, and we could well adopt the idea in symbol. What better way to mark the passing of the old year than by making a bonfire of those nagging memories of bygone mistakes, the petty irritations and unworthy doubts, the fears that sap our confidence, and destroy initiative? We must stop raking over the ashes of our past blunders, and turn to the bright glow of our aspirations for warmth for heart and hands.

For most of us, the month of January is a period when we are full of good intentions, such as getting up earlier, devoting half an hour daily to improving our minds, doing physical jerks regularly, turning out the house so thoroughly every week that the rigours of an annual spring-cleaning are unnecessary, and so on. But our resolutions should cover a wider field than this.

What about resolving to be more accessible to those among whom we live, not only in practical matters, but in the ways of the spirit? We must not become so immersed in our many activities that we have neither time nor thought to spare for the perplexities and problems of our neighbours. One of the finest women I know is the mother of a large family, and she not only copes successfully with endless domestic and outdoor duties single-handed, but with many other demands as well. Her home is a refuge for all who are in need of sympathy, aid or encouragement. The mantelpiece may be dusty at times, and the ironing unfinished, yet there is no inward lessening of patience to mar the kindliness of her welcome, no dulling of those precious qualities of helpfulness and understanding. In that household "first things" are indeed supreme.

Happy New Year

In these days of strain we must look to the abiding things of life for our comfort and consolation: the steadfast hills; the serenity of quiet skies and green fields; the golden portals of poetry, and art, and music; the song of birds, and the laughter of little children. Despite the sorrow and destruction which the present holds for so many of us, let us have faith in the future, remembering that courage and truth and love still endure. They are worth whatever the price we are called upon to pay, even as they merited the supreme sacrifice of the Cross long centuries ago.

And so, with these thoughts to companion you in the coming days, a happy New Year to you all, each and every one of you.

Mary

GRIT REQUIRED

IT TAKES grit to do these things:—

To be patient, and keep your temper.

To improve your mind, and keep your body fit.

To save money.

To tell the truth, and to mind your own business.

To keep your mind clean, your body clean, and your soul clean.

To do what you don't want to do, because you ought to do it, which means discipline.

To be loyal to your principles, to your wife or husband, to your friend and to your country.

To say, "I don't know," and not to pretend to know.

To do your own thinking.

Not to worry or be afraid.

Helpful Hannah Says . . .

Pour the contents of your starch bowl into the blue-water on washing day, and scrub your benches down with it. This will keep the wood white and spotless.

* * *

A tasty sauce to serve with boiled rice, etc., can be made from a tablespoon of raspberry jelly crystals mixed with hot water, thickened a little with cornflour, and sweetened to taste.

* * *

Hot milk will remove the greasiest stains in or about your gas stove or your washing up sink.

* * *

Hammer two or three nails into the end of the clothes prop, leaving them projecting, say, half an inch. This prevents the prop from slipping on greasy and wet ground.

* * *

Keep the water potatoes are boiled in for washing silver. It makes forks and spoons beautifully white, and removes any stains.

* * *

Never hang a sweater on a hook. It should always be hung on a coat hanger. To prevent the shoulders from stretching and sagging, sew in a length of ribbon from neck band to the top of the armhole on each side. The ribbon should be the exact length of the shoulder of the person who wears the sweater.

* * *

New clothes pegs should be plunged into boiling water and left to soak overnight. This softens the wood and prevents them from splitting when first used.

* * *

Sew a small label bearing your name and address inside your best gloves; if you lose one the finder knows where to return it.

JOBS IN PEACE TIME

"THE NATION WHICH WISHES TO BE GREAT MUST PLACE ENTERPRISE AHEAD OF SECURITY—"

Achievement is not something which happens of its own accord. Behind every great musician, artist, or scientist, is the encouragement given by those with vision . . . the same vision which, coupled with daring and initiative, enables men to grasp and bring to realisation a new enterprise which benefits not only themselves and those around them, but the nation as a whole.

" . . . We must regard innovators, experimenters, starters of enterprises, as peculiarly useful citizens and go out of our way to furnish them a congenial and hospitable environment .... We must strive to increase the proportion of our citizens who become experimenters and innovators and who make their living, not by getting on someone else's payroll, but by creating payrolls of their own."

SUMNER H. SLICHTER,
Professor of Economics, Harvard University.

H. C. URLWIN LTD.

Pioneered the Plastic Industry in New Zealand, therefore making possible the mass production of Electrical Wiring Devices and Appliances.

Other Countries, Other Customs

THROUGHOUT the ages, the advent of New Year has always been heralded by special celebrations. In our own country, the day is usually given over to picnics, race meetings, sports fixtures, or other outdoor activities.

The practice of calling upon our friends on New Year's Eve has its counterpart in "first-footing," which is observed in the North of England and many parts of Scotland, it being regarded as particularly fortunate if the first person to step over the threshold after midnight is a dark-haired man.

Our Saxon ancestors welcomed the birth of another year in characteristically hearty manner, giving themselves up to feasting, drinking, and enjoyment. The ancient Romans held magnificent processions and masques, and other revelries. Perhaps you will be surprised to know that the Scottish people, despite the reputation for meanness with which the world's humourists have saddled them, give presents at New Year, revealing their true generosity thereby, and this pleasant custom is also a French one.

The Gate of the Year

And I said to the man who stood at the Gate of the Year: "Give me a light that I may tread safely into the unknown." And he replied: "Go out into the darkness and put your hand into the Hand of God. That shall be to you better than light, and safer than a known way."

So I went forth, and finding the Hand of God, trod gladly into the night. And He led me towards the hills and the breaking of the day in the lone East.

—M. Louise Haskins.

Russian Gifts

Offerings of candy were a recognised part of the festival proceedings in the days of the Russian Empire. Some of the containers in which the sweetmeats were arranged bore decorative patterns of jewels, and were exceedingly valuable in consequence.

In Persia, the traditional gift is one of eggs, being reminiscent of Easter rather than of the New Year to our Western minds. An annual bath and hair-cut is also the order of the day among the Persians. Schoolboy sons waging unequal battle against muddy knees and grimy finger-nails will doubtless comment: "Jolly sensible people, the Persians!"

George Washington is said to have created the precedent, which has been followed by American Presidents ever since, of receiving on the first day of January. Though the various States differ in their choice of dates for the observance of other holidays, New Year's Day is universally celebrated in the U.S.A.

Chinese Make Merry

In the Chinese ceremonies decorations have an important place, red—the colour of joy—being used for flowers and banners and paper characters depicting happiness, good fortune, longevity, etc., which adorn every doorpost. Everyone dresses in his finest attire, and visits, or is visited by his friends. Banquets are held and fire-crackers let off. The merry-making goes on for some days till it ends in the time-honoured Festival of Lanterns.

The Tibetans also have a picturesque ritual, when monks and men-at-arms, officials and humble populace, gather on the 29th day of the old year to witness a devil dance for the exorcising of malign influence. The dancers wear grotesque masks of papier-mache, and paper effigies of evil spirits are burned in boiling oil. On New Year's Day proper, the people indulge in games and fireworks, and vast quantities of cakes, biscuits, and home-brewed chang (wine) are consumed.

Three Blessings

Many calls are paid, each guest presenting his host with a scarf of greeting. The New Year wish in Tibet is: "May you enjoy the three blessings—health, wealth, and good repute—and may your days be filled with peace and happiness."

Tips for Your Sewing Machine

A DULL or blunt needle pulls threads, causing side puckers when stitching. To sharpen, take the needle between the thumb and middle finger, roll it, and at the same time draw it lengthwise over a fine emery stone. Guide with the forefinger.

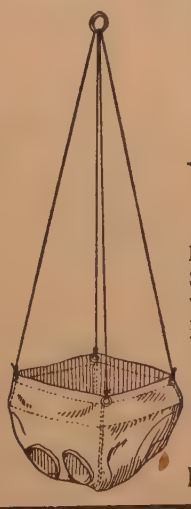
If the treadle is loose and noisy, tighten the bearing at whichever end of the treadle is most convenient to reach. Place a screwdriver in the slot of the adjusting bolt, hold it firmly as you loosen the lock nut with the wrench. With a screw driver, tighten the bolt until it is just tight, then loosen it slightly. Tighten the lock nut. Run the machine.

Caution: A bearing that is too tight makes the machine run hard.

"Roylete" Baby Goods

Safe, Strong, Practical, Attractive

B112 DROPSIDE COT
Made of all wood, stained or enamelled. Dropside is held up beneath the cot. Makes it impossible for the child to let it down.



B126 BABY SWING
Strong white duck, with hanging cord, free from splinters. Will keep baby happy and safe.

B132 CHILD' PLAY PEN.
Wooden Play Pen, 4 ft. x. 3 ft., folds flat when not required. Has coloured beads on side for amusing baby. Can be used as clothes drier.

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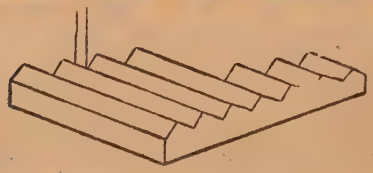
Our fight for freedom is a fight for the right of a new generation to make a new world .In the world of to-morrow the good things of life, such as Onehunga Blankets, will be restored in plenty. Until then the Onehunga mills must weave for war and supply warmth and comfort for those on active service. Please remember this if you cannot buy Onehunga Blankets, and join with us in the hope that a new to-morrow will soon dawn in which peace and plenty return to our land.

ONEHUNGA



ONEHUNGA BLANKETS—AIR CELL BLANKETS — ONEHUNGA TRAVEL RUGS — ONEHUNGA WOOLLENS

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CHILDHOOD RECOLLECTIONS

Pranks, pets and picnics, faraway school days and Christmas festivities—how I enjoyed reading the many reminiscences made so vivid for me by your pens, and how I wish I could share them all with you in print. Whether your memories were gay, sad or humorous, whether they were of English lanes or colonial farms, the love of home and family was the dominant theme in every recollection. So remember, all you mothers, how vitally important is your task, and do not let yourselves become wearied or dispirited in your home-making activities, for with you rests the sacred responsibility of giving your children a happy, healthy childhood, so that they may grow into worthy citizens of our fair land.

First prize goes to "Peggy," Pleasant Point, with "A. M. Dowell," Inglewood, and "Jeannie," Wellington, tying for second place.

First Prize

HOW lovely it is to think about childhood days. All my life I have lived in the same large stone house in a green valley, and the farmlands have belonged to my family for nearly seventy years.

An outstanding memory is that of my first days at school as a very shy six-year-old. The other pupils, being much older, loved to tease and annoy me, and they were so unkind at times that they made me cry. I was quite afraid of them, and those early school-days were the most unhappy ones I have ever spent.

But at last one day brought release from my tormentors, for a new pupil of my own age started, and we became fast friends, much to my delight. We always kept well out of the way of the older ones at playtime, and I can remember so well we two little girls grabbing our lunches in the dinner hour and running as fast as our sturdy legs could carry us to a lovely sheltered spot near a tiny creek. I loved school after that. However, those early school days taught me a lesson: to be kind to others, specially new or young pupils.

Never shall I forget the excitement of having a pony of my very own. I lavished all my love on him, but he was a tricky little fellow, and it was a long time before I could ride him properly. He would bolt at the least excuse and shy at any obstacle. One morning my brothers and I were late for school, so we all decided to ride him. Off we went at a canter, and everything went well till we met a wandering pig: the pony shied and bolted for home, while we three landed on the road, unhurt, but badly shaken. I loved riding him round the hills with my father to look at the sheep and cattle.

My first party was one given by my mother for a schoolmate who was leaving the district. What fun we had playing games, and what a scrumptious afternoon tea followed. It was in those yesterdays of childhood that my love for reading prose and poetry began. I enjoyed Amy le Feuvre's books and cried over Hesba Stretton's. Nor do I forget my little Welsh grandmother who was so kind to me. I loved to sit on her knee and listen to her tales, both true stories and fairy ones. She was passionately fond of music and I can still hear myself saying to her "When I am a big girl, Grandma, I will sing and play for you." Alas, long before I had piano and singing lessons she had passed on to a fairer land.—**Peggy, Pleasant Point.**

Second Prize Equal

MY earliest recollections seem to have much to do with the fashioning of mud-pies of every variety. We were a large family living on a back-blocks farm, the nearest other children ten miles distant, so we were obliged to make all our own amusement. Naturally we small fry lived in an almost perpetual world of make-believe, with the world very much our oyster. We were fortunate in having all the fairy tales and so on that we could read, and we were all prodigious readers. Consequently, some days we would be kings and queens of mighty kingdoms, with wonderful palaces and all the dishes of pure gold, our mud-pies set out as sumptuous banquets; the next, we would be prima donnas or master musicians holding spellbound a packed Albert Hall, and afterwards there would be a magnificent supper at the Ritz—more mud-pies!

Sometimes, in the spring, there would be a beautiful wedding, the bride decked out in trailing clematis blossoms, and the wedding-cake a three-decker (dark-coloured mud iced with white papa clay) decorated with sweet-smelling wild flowers and the colourful young fronds of water-ferns. The sublime seemed in those days to mingle very satisfactorily with the ridiculous.

Now, my own offspring . . . thank the good Lord! . . . have never shown the slightest wish to make mud-pies. Once, I mentioned my youthful aptitude for the art to them, only to be met with a horrified, "Gee, Mum, you MUST have been a grubby little beggar." Well, after a morning's "baking" I dare say I was.—**A. M. Dowell, Inglewood.**

Second Prize Equal

CHILDHOOD memories, how they jostle and crowd each other in one's mind. There was the time that I, at the age of three, trotting round the General Store, poked a dried pea up my nose. The days it took to make anyone understand, and the consternation that little pea caused until a distracted parent finally hit upon the brilliant solution of making me "Blow hard," and out shot the pea—with a little green shoot unfolding!

We lived near a most realistic "wood" of fir trees, and the Williams' boys—great big fellows of nine and eleven—used to take me for walks in my little Red Riding Hood in the "woods." We would solemnly plant a penny under a certain stone, and tiptoe away to return next day. Would you believe it: that penny had invariably grown an-

other penny! Then came the bitter day when I was badly let down—my beautiful big fat penny had shrunk into a miserable little threepenny bit.

Uncle Jack came to stay when I was six. Now there was an uncle for you. He played the most exciting games with the dolls and me, and tied carrots on to the clothes-line and donated 6d. prizes to the ones who could eat the most (hands tied behind backs). I did look forward to his next visit. I need not have. He just could not settle down to play or even conduct an intelligent conversation with his adoring niece. I overheard him telling Mother in distracted tones something about "She's a wonderful girl," and with a hollow groan, "What will I do if she turns me down?" If he had had a pain in his tummy through eating green gooseberries I could have understood it, but grown-ups are queer, unpredictable creatures.

(*Continued on page 78.*)

THE SAD CASE OF MISS X

Miss X came to buy a Berlei. The shop had nothing in stock for her figure type, but the new girl behind the counter was anxious to please, and showed her the next nearest fitting, and Miss X, in desperation, bought it. She never felt happy in that Berlei. She blamed the store, and Berlei, but actually she knew herself that it was not her fitting.

★ ★ ★ ★ ★ ★

This sad story is too often enacted nowadays. Its moral is, don't ever buy a Berlei that's the nearest to your own figure type fitting. Better to wait, or at a pinch, better to shop elsewhere. Your own store would much prefer you to do this, rather than sell you a Berlei that can never be completely satisfactory.

Please remember there are plenty of Berleis for everyone, and today, with the restrictions on the use of elastic, it's vitally important you get the Berlei that's exactly right for you.

Remember these points when being fitted:

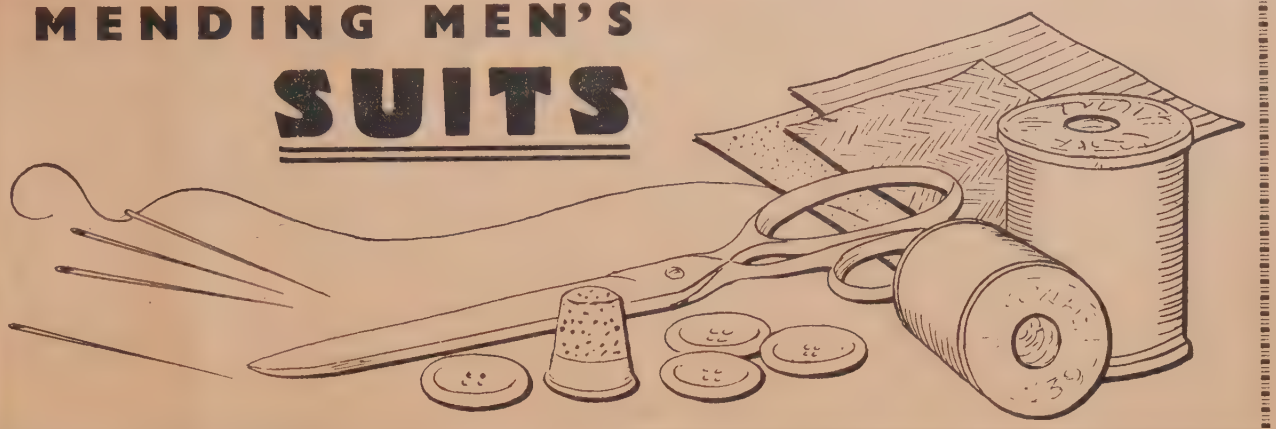
1 *Be sure you try sitting in the garment.*

2 *Be sure you ask for a little more room at the waist.*

3 *Be sure you bend and stretch in the garment to test it for freedom of movement.*

Berlei
TRUE-TO-TYPE FOUNDATIONS

MENDING MEN'S SUITS

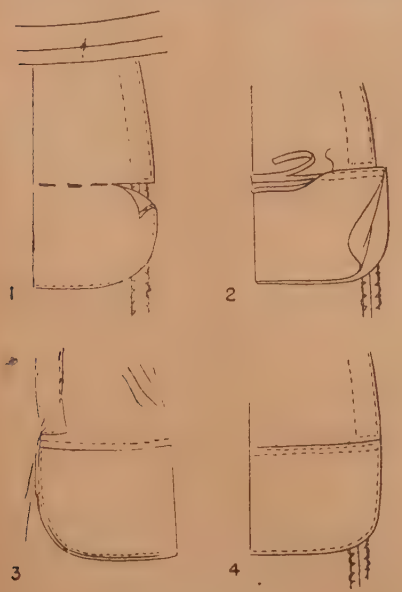


THIS article, "Mending Men's Suits," by C. L. Scott and A. F. Hagood, is reprinted from a bulletin issued by the United States Department of Agriculture.

INSIDE POCKET REPAIRS.—If the inside pocket has only a small hole in the corner, restitch the lower edge of the pocket above the hole. Do not cut off the pocket below the stitching.

HALF POCKET REPAIR.—If only the lower part of the pocket is worn out, make a half pocket repair.

1. Cut off the worn part of the pocket. Lay the folded edge of this old pocket bottom on a length-wise fold of new pocketing. Cut a new half



pocket, adding three-eighths inch for seams at the side and twice this amount for the top edge, which will be seamed to the old pocket.

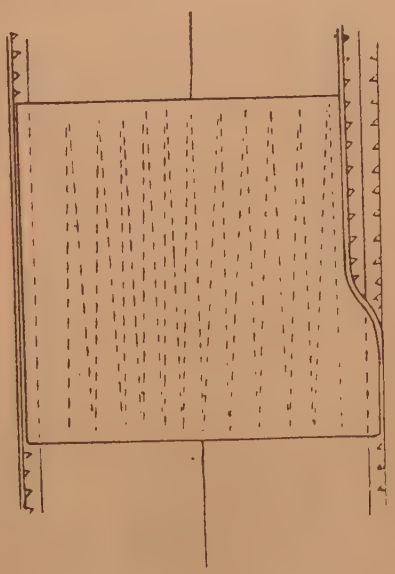
2. Sew the new half pocket to the old with the seam outside. Press this seam up, trim away the under half, and finish as a flat fell. This keeps the inside of the pocket smooth and comfortable to use.

3. Turn the pocket inside out. Take a one-eighth inch seam around the side and bottom.

4. Turn the pocket back into the trousers and finish as a French seam by stitching one-fourth inch from the edge. Fasten off the threads at the end of the stitching.

Remember to keep the pockets on both sides of the trousers exactly the same length.

Worn Trouser Knees.—When knees wear through, they may be patched in the same way as worn elbows. If you have enough material, you can make this patch less noticeable by extending the patch block to the nearest side seam.



If knees are worn so that only lengthwise yarns are left, darn by hand to matching or harmonizing cloth tacked to the inside. Use thread that matches material or is slightly darker.

Illustrated is a quick, strong mend that is practical for boys' everyday pants and men's work suits. Lay the worn spot over a patch. Baste the patch in place. From the right side stitch back and forth closely by machine with thread that matches perfectly. This mend will show more than a hand darn does unless the cloth has a mottled or tweedy pattern.

Seamed Knee Mend.—If the trousers still have plain cuffs, a strip of wear may be cut out of the knee, the lower part of the trouser leg moved up and seamed at the knee, and the leg finished without a cuff.

1. Open the cuff and rip the two leg seams from the bottom to a little above the worn place at the knee. With ruler and chalk mark a line

straight with the crosswise yarns close to the top of the worn spot. Mark another line just below the wear. Check the distance between these two lines to make sure it is the same all the way across. Cut out this worn section of the knee on the two chalk lines.

2. Then seam the raw edges of the two remaining parts of the trouser front together. Press the seam open.

This will change the side edges of the leg front a bit, so lay a ruler along each side, strike a straight line, trim on this line, and reseam the trouser leg at the sides.

To mark the lower edge of the trousers for finishing, measure down from the top crease the exact width of the piece cut out of the leg plus two seam allowances. This new line at the front should correspond with the top crease at the back of the leg.

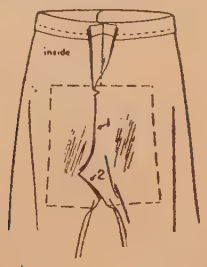
Allow about 1¾ inches more for a hem, then cut off any material that is left. Finish as a hemmed trouser leg.

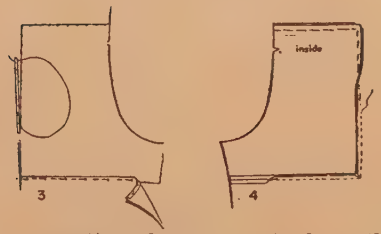
3. For everyday trousers, make patch more durable by stitching by machine on each side of the seam line rather than finishing by hand.

4. Make the seam across the knee less noticeable with the rantering stitch.

Cross-stitch to hold seam edges flat inside.

To Reseat Trousers.—When trousers are so badly worn in the seat that you can no longer repair them with patches and darns, reseat them. Cut material





for reseating from a vest, from the more worn of two pairs of matching trousers, or from a discarded coat. Sometimes you can find oddments of matching material in shops.

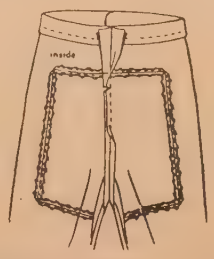
Make notches or marks that will serve as a guide in reseaming.

1. Rip open the back rise beginning about 6 inches from the top of the trousers.

2. Rip the inseams down 3 or 4 inches.

Mark with chalk the worn part to be cut out. If the suiting is striped or checked it will be easier to hide the seam and match the piece if you cut the worn place out with the crosswise and lengthwise yarns of the goods. If trousers are of plain material, make the outer edge of the new seat curved.

Use the piece you have cut out as a pattern for matching and cutting the new seat. Allow double seam allowance around this piece to make up for the seam that must be taken from the trousers to sew in the new seat.



3. Turn under and press lightly a seam allowance around hole cut in trousers. Clip corners the depth of the seam allowance. Lay the new seat under this hole and match carefully from the right side. Baste the trousers to the patch with loose hemming stitches. Let these stitches catch only in the edge of the folded trouser edge. They serve as a guide for the inside stitching and will be pulled out later.

4. Turn the trousers inside out and stitch by machine exactly on this line of hand stitching. Press the seam open.

5. If the trousers won't be worn for "Sunday best," strengthen this seam by turning to the right side and stitching by machine close to each side of the seam. This will also hold the seam flat on the wrong side.

To finish the seam so that it is less noticeable—instead of strengthening by machine stitching on the right side, hide the seam line with the rantering stitch used to finish the collar roll. (Described in Journal of Agriculture, Sept., 1943, page 225.)

6. Then, to hold the seam flat on the inside of the trousers, catch stitch as illustrated.

Restitch the inseams and back rise of the trousers and press.

(To be continued.)

Childhood Recollections

(Continued from page 76.)

I remember those holidays down the Sounds with my cousins and the exciting picnics by the creek, and the time Johnny "borrowed" some eggs out of the nest, boiled them for half an hour in a tin, then urged by a guilty conscience, returned them to the nest. It was just our luck that those were the ones chosen for the sponge cake! That same holiday Mother was called upon to read the bedtime story. It was a most intriguing tale about a little brown bunny, and as the adventure unfolded and the plot thickened, small Johnny crept closer and closer to the reader till he was kneeling on the table, and the rest of us, too, listened with bated breath and eyes wide with wonder, just as a little brown bunny dashed round the corner not six inches from Rover's nose—and here Mother shouted with laughter and dropped the book because we looked so tense. The dramatic effect was entirely ruined.

On one dreadful occasion I poked a crochet hook in my ear because I had seen some thoughtless adult doing so. Well I remember how my poor ear ached and how to take my mind off it, the Lady-next-door sat me on her table and let me look through her box of best hankies. Because I wanted it so badly (or perhaps, needed, is the word) she gave me the one with a blue butterfly fluttering across the corner.—**Jeannie, Wellington.**

Highly Commended

MINE is rather a comical recollection. I must have been rather young at the time—perhaps not more than three—but I remember the whole episode very clearly. We three children had developed a great affection for spiders and nothing would satisfy us but that Mother must go out to the washhouse and find a spider for each of us in the windows. The three of us stood in a little semicircle round her, watching anxiously as she caught each one. It must have been rather a difficult task, but Mother managed to secure the three spiders at last (though in my opinion mine was a trifle small) and we wrapped them carefully in three scraps of newspaper to carry in our pockets. Then we set off across the paddocks to see our grandmother. Arriving there, we each pulled out our little piece of newspaper, my brother and sister carefully unwrapping theirs and displaying the spiders to sympathetic Grandma, who somehow managed to keep a grave countenance. Alas! when I opened my bit of paper there was no dear wee spider within: all that remained of him was a tiny "splodge."—**Elysar, Nelson.**

Mary's Mixing Bowl

Summer Holiday Time

NOW that the schools are closed for a few weeks, many of you will be planning picnic meals for the children, so I thought I would give you a few ideas for holiday fare, not only suited to the young people's tastes, but guaranteed to tempt grown-up palates as well. Now that butter-rationing is here, keeping up the sandwich supply is a problem, but the following list of fillings will help you, each filling being so delicious in itself that the accompanying bread requires only the merest suggestion of butter upon it.

SANDWICH FILLINGS.

Honey sprinkled with finely grated raw carrot.

Slices of cooked bacon and crisp lettuce.

Minced cooked liver and grated cheese.

Mashed banana sprinkled with lemon juice and brown sugar.

Chopped celery and walnuts.

Dried beans, cooked and mashed, with watercress.

But there are lots of other things beside sandwiches which make good eating at a picnic. Have you ever tried jellied soup?

JELLIED SOUP.

One pound tomatoes, 1 onion, 1½ pints water, 1 oz. flour, ¾ pint milk, salt and pepper, 1 oz. gelatine.

Slice tomatoes and onions, add seasoning, and cook in the water till tender. Press through a collander. Make a white sauce with the flour and milk and boil 3 minutes. Then add the tomato pulp gradually till the mixture is smooth. Bring to boiling point and stir in gelatine previously dissolved in hot water. Pour into individual moulds (or cups) and leave to set.

If you wish to keep your tomatoes for other purposes, try making a thick vegetable soup and jellying it, the proportion of gelatine to use being 1 dessertspoon to half a pint of liquid.

STUFFED EGGS.

Instead of plain hard-boiled eggs, serve them this way: Hard-boil whatever number of eggs you require. When cool, slice them in half (leaving the shells on), and scoop out the yolks. Mash the yolks, mix with finely grated raw carrot, a dash of mayonnaise, and chopped watercress, season to taste, and pack the mixture back into the white-lined shells. This will facilitate carrying, and the eggs can be eaten straight out of the shells by using a spoon.

POTATO SALAD.

Select large-size lettuce leaves, wash and drain well, and fill with cooked potatoes cut into small cubes, cooked green peas, cucumber slices, and cubes of cooked carrot. When ready to serve, pour mayonnaise over each helping.

MAYONNAISE.

One egg, 1 teaspoon each of flour, salt, and mustard, 1 tablespoon butter, 1 tablespoon sugar, ½ cup milk, ½ cup vinegar.

Mix salt, mustard, flour, and sugar together with water to form a smooth paste, add the egg well beaten, blend in the milk, and add the butter. Cook over a pan of boiling water and as the mixture warms drop in the vinegar a little at a time, stirring all the while till the mayonnaise thickens. Bottle in an air-tight jar, and you will have a salad dressing that will keep for several weeks.

Here is a recipe for cheese scones which does not call for any of your precious butter allowance.

CHEESE SCONES.

Six ounces flour, 4 ozs. grated cheese, ½ teaspoon salt, 1 small cup milk, 1½ teaspoons baking powder.

Mix all the dry ingredients together and stir in sufficient of the milk to make a firm dough. Roll out on a floured board and cut into shapes. Bake in a quick oven for about 12-15 minutes.

FROSTED CAKES.

These little cakes make a perfect finish to a meal:—

1¾ cups flour, 1 cup sugar, 1¾ teaspoons baking powder, 1-3 cup butter, 2-3 cup milk, flavouring, 1 egg.

Cream the sugar and butter, add the dry ingredients which have previously been sieved together, a few drops of flavouring, the beaten egg, and lastly the milk slightly warmed. Beat the mixture thoroughly for two minutes, then pour on to paper cups and bake in a moderate oven 20-25 minutes.

For the frosting, blend ½ cup of icing sugar and a hint of flavouring essence with the stiffly beaten white of an egg. Let the cakes cool before icing them.

GARDEN MEALS AT HOME.

For those who cannot join in the happy outings to sunny beaches or bushclad hills, but must carry on with the work at home, I suggest that you make a break in your everyday routine and add zest to your appetite and a sparkle to your eyes by having as many of your meals out-of-doors as possible. Build up your resistance to winter ills through getting all the fresh air you can, and absorbing the valuable health-giving properties of Vitamin D from the sunshine. Simplify your table arrangements and keep all the necessary cutlery and crockery together on a tray, so that no time is wasted hunting for the articles required. Let each member of the family be responsible for carrying out to the garden some portion of the items needed for the meal, saving you those endless trips back and forth to the kitchen. Now for some recipes specially for summer days.

STEAK GALANTINE.

One pound stewing steak (minced), 1 onion, salt and pepper, handful of peas, 2 carrots, gelatine.

Chop the onion and carrots, add with the peas to the minced steak. Season to taste and cover with water. Bring to the boil and simmer gently till the steak is tender. Measure the liquid and to each ½-pint allow 1 dessertspoon of gelatine dissolved in hot water. Add this to the steak and then turn into a mould to set. Serve with salad.

VEGETABLE CASSEROLE.

1½ tablespoons beef dripping, 3 tablespoons onion, 1 cauliflower, new potatoes, green peas, 6 tablespoons meat gravy (or stock), salt and pepper.

Melt the dripping and brown the onion in it for a few minutes. Divide the cauliflower into flowerets and place in the casserole, together with the peas and new potatoes, onion, and dripping. Season to taste (a teaspoon of chopped mint gives a delicious flavour). Pour over the gravy or stock and place the lid on the casserole, simmering gently in the oven at a low heat for 1 hour.

MOCK CUTLETS.

1½ ozs. flour, 2½ gills meat stock, 2 tablespoons onion, tomato sauce, salt

and pepper, ¾ lb. left-over meat, minced egg, and breadcrumbs.

Make a sauce of the flour and stock (vegetable water or gravy will do if you have no stock), adding the onion chopped very fine, seasoning, and a dash of tomato sauce if you can spare it. Simmer for 5 minutes, stirring constantly, then add the meat minced. When cool, divide the mixture into seven equal portions, shaping them into "cutlets" on a floured board. Dip them in egg and breadcrumbs and fry in deep fat till they are a rich golden brown. Drain well and serve piping hot.

Competitions.

JANUARY:

We have all had to forego many small luxuries during the last few years. Silk stockings and unlimited sugar supplies, holiday jaunts by car, and labour-saving gadgets in our homes—will any of these figure on your list in our next competition, "What I Miss Most in Wartime." Send your entries to me by February 15th.

FEBRUARY:

From what source do you gain courage to "carry on" when worry, grief or misfortune threaten to overwhelm you? Do you turn to the quiet friendliness of books, do you seek the magic delights of melody, or the beauty of flowers perhaps to help you through what one writer has called "the seemingly intolerable present?" ..

"COURAGE TO CARRY ON."

Entries for our Easter competition close on March 15th, and the two prizes are 10/- for first, and 5/- for second.

"MARY,"
C/o "Journal of Agriculture,"
P.O. Box 3004, Wellington.

FRUIT FLAN.

Four ounces flour, 2 ozs. butter, 1 teaspoon sugar, 1 egg yolk.

Rub the butter lightly into the flour, add the sugar and baking powder, and lastly the egg well beaten. Now roll out and line a greased flan tin with the pastry, putting a layer of greased paper on top of the pastry and weighing it down with a few bread crusts. Bake in a hot over for 25 minutes. Just before it is ready remove from the oven and take out crusts and paper and then dry off the flan for a few minutes longer in the oven. Fill with fresh fruit or if stewed fruit is used, thicken the syrup slightly with a little arrowroot.

CUSTARD MOULD.

One pint milk, vanilla flavouring, 1 egg, 2½ ozs. sugar, 2 dessertspoons gelatine, 3 tablespoons hot water.

Bring milk to the boil and stir in the egg, sugar, and flavouring, which has been previously beaten together. Dissolve the gelatine in the hot water and add to the custard. Pour into a mould and leave to set.

BLACK CURRANT PUDDING.

Stale bread or sponge cake, and black currants stewed with sugar.

Line a pudding basin round the sides and on the bottom with strips of stale bread (from which the crusts have been removed) or sponge cake. Fill the basin with black currants which have been stewed with sugar in very little water, and after stewing the liquid has been drained off and the currants pulped. Now cover with bread or cake-slices, and place a saucer over the top of the basin with a weight upon it. Leave overnight, and turn out on a dish next day and serve with custard.

FRUITOLINA.

Two pints stewed fruit, 4 dessertspoons semolina, 3½ ozs. sugar.

Sieve the stewed fruit to form a puree, keeping back the juice, of which there should be 3-4 cups. Boil the juice and stir in the semolina gradually into this. When the semolina is cooked add the fruit pulp and simmer another few minutes. Serve in individual dishes topped with chopped cherries or jam.

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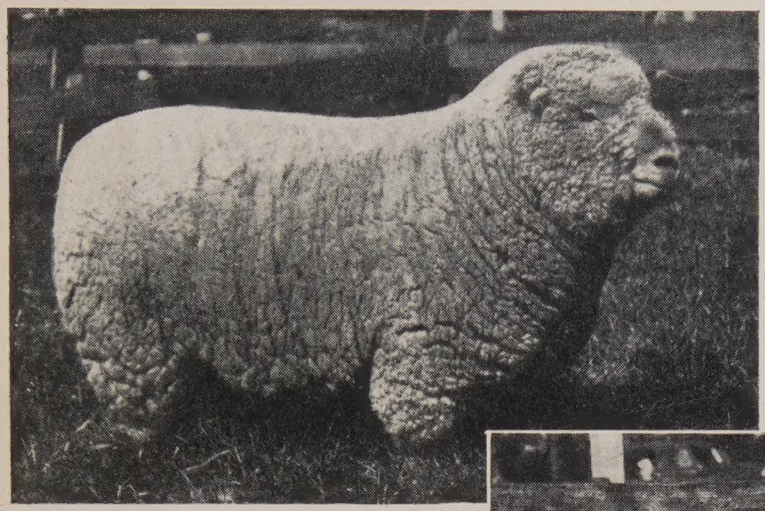

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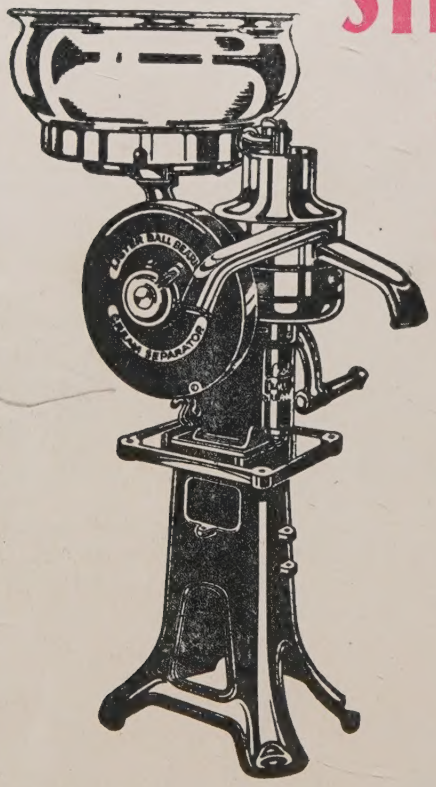

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